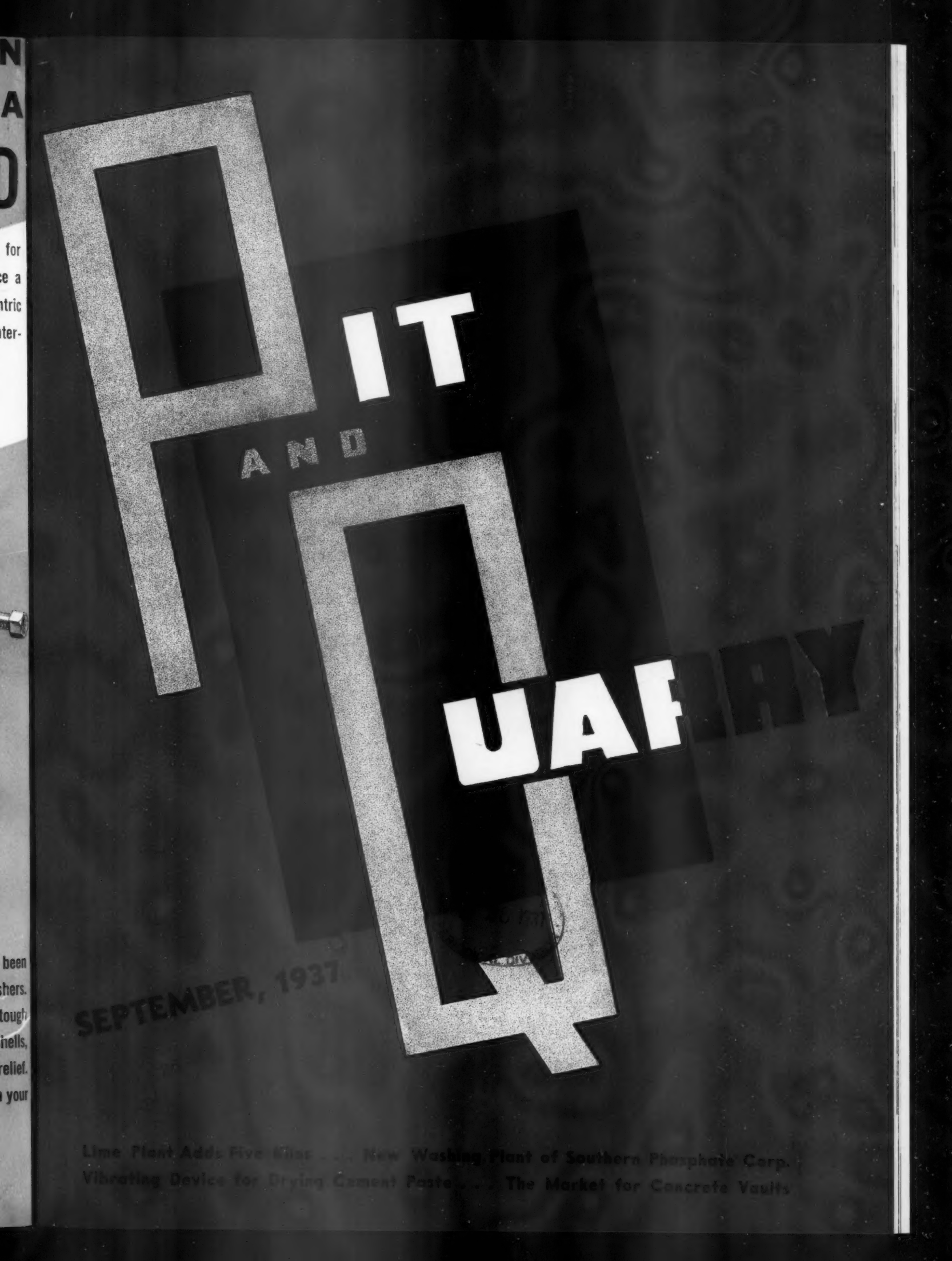
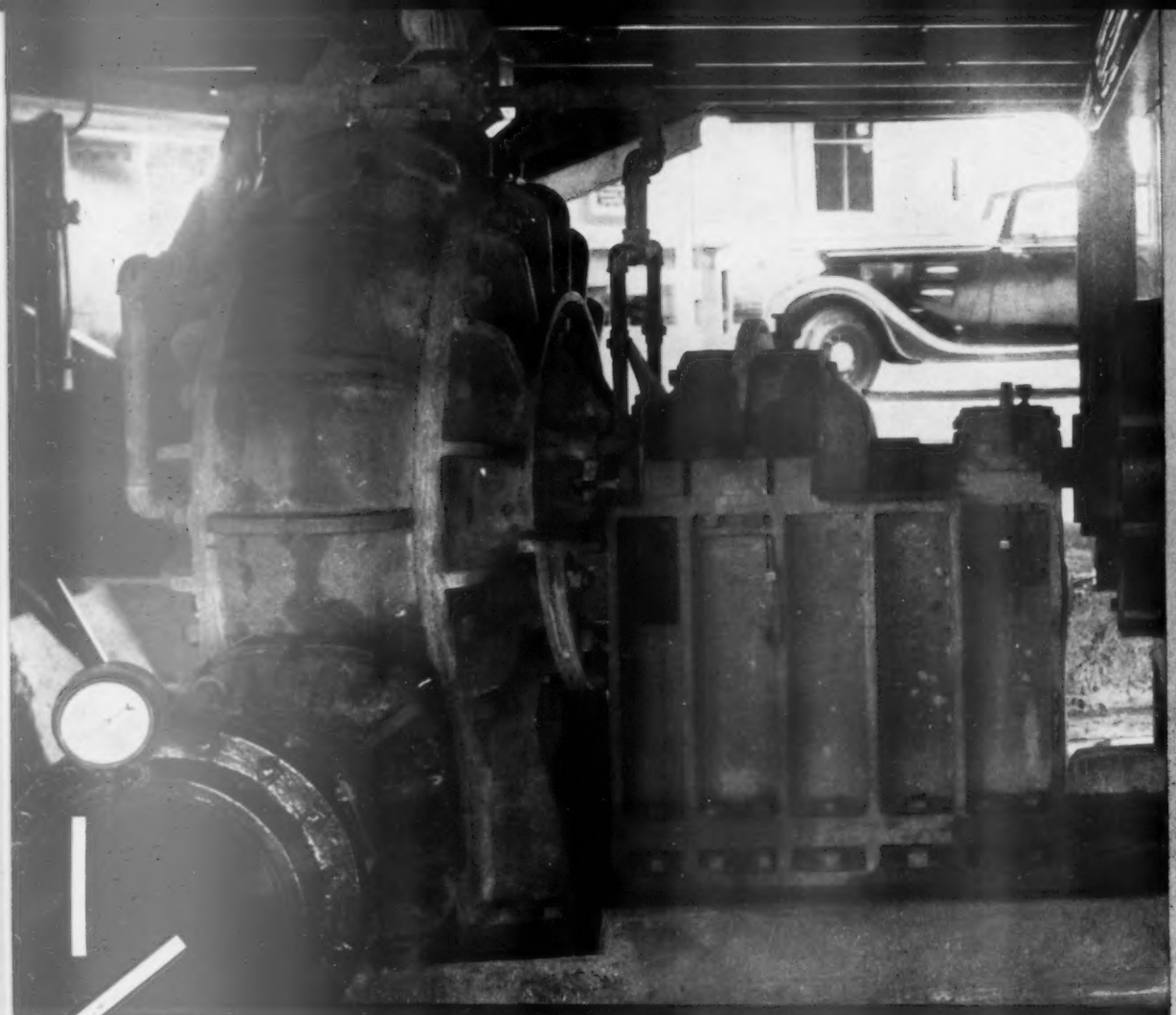


Lime Plant Adds Five Kilns ... New Washing Plant of Southern Phosphate Corp.
Vibrating Device for Drying Cement Paste ... The Market for Concrete Vaults



1/3 POWER SAVED

ALL SIZES — LARGE OR SMALL

A world-famous mining company (name on request) tried almost every conceivable make of pump. Accurate "costs per ton" were kept under various conditions as to length of pipe line, lift, percentage solids carried, etc. Their records show that on the average the Hydroseal Pump uses ⅓ less power. On the basis of these tests, they have since ordered twelve more Hydroseal Pumps to replace pumps of outmoded design . . . Unfailing reliability is of major importance in the installation pictured, which shows a 16" Hydroseal Dredge Pump . . . Address the nearest office listed at the right for a copy of our catalog No. 836 or any other information.

HYDROSEAL Dredge PUMPS

ASH

HYDROSEAL AND MAXIM
DESIGNS ARE COVERED
PATENTS AND APPLICATIO
IN THE MAJOR MINING CENTE
OF THE WORLD AND CAN
PURCHASED ONLY THROUG
THE FOL' OWING COMPAN

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PUT LINK-BELT EXPERIENCE INTO YOUR NEXT CONVEYOR INSTALLATION

Profit by the ideas gained from thousands of practical cost-cutting installations handling every conceivable kind of material and employing every type of mechanical conveyor unit.

Link-Belt makes them all, and recommends and applies each where it serves best. Send for catalogs. Address nearest office.

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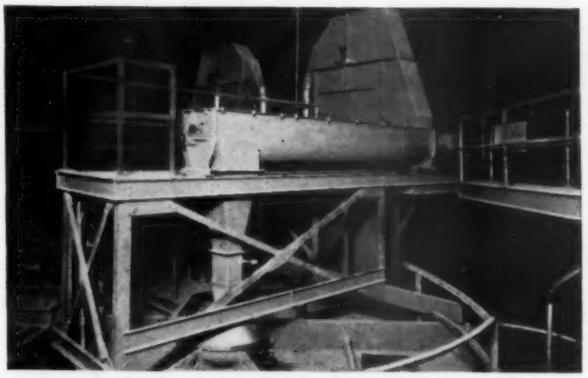
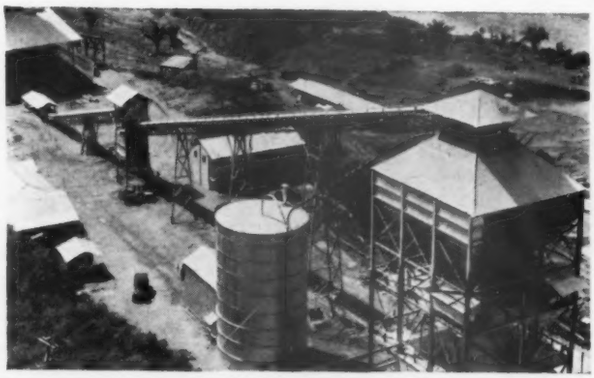
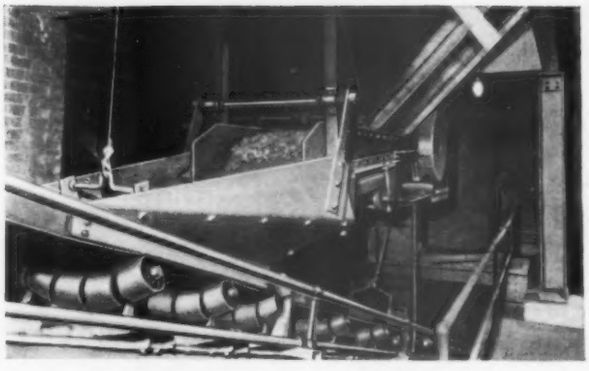






LINK-BELT

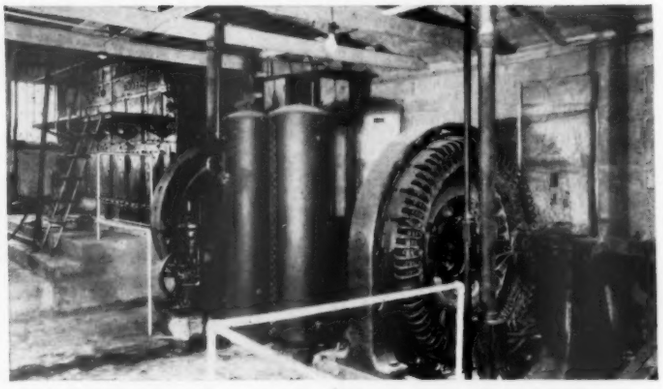
Equipment for Preparing Sand, Gravel, Stone

PIT AND QUARRY, September, 1937. Vol. 30, No. 3. Published monthly by the Complete Service Publishing Company, 538 South Clark Street, Chicago, Ill. Subscription price $1 for 1 year in the U. S. and possessions, Canada and Central and South America; elsewhere $1 additional for each year. Single copies 20 cents. Entered as second-class matter November 28, 1932, at the Post-Office at Chicago, Ill., under the Act of March 3, 1897. Additional entry at Milwaukee, Wis.

Working on the "Rock Pile"..

Since 1934, this husky Superior Diesel has been working on the "rock pile", and it will continue to earn a good profit for its owner for years to come, in powering this quarry and crushing plant.

The dependability and operating economy of Superior Diesels in this service can be proved in your plant just as well as in the many other plants of this type now using them.



Narehood Brothers, Milton, Pennsylvania, coupled this 475 H. P. Superior Diesel to an old generator in their rock crushing plant.

Ask us to make a power survey of your plant. No obligation.

THE NATIONAL SUPPLY COMPANY
OF DELAWARE
SUPERIOR ENGINE DIVISION, SPRINGFIELD, OHIO
LOS ANGELES, CALIFORNIA PHILADELPHIA, PA.

Superior DIESELS

HEAVY DUTY MODELS: 50 to 810 H.P., 250 to 720 R.P.M. • HIGH SPEED MODELS: 15 to 150 H.P., 900 to 1800 R.P.M.

Hook it to Any 35 to 50 H.P. Tractor.

CONTINENTAL

The New JUNIOR CONTINENTAL WAGON SCRAPER

The long-felt need for a Wagon Scraper of smaller capacity has now been filled by the new four-yard Junior Continental Wagon Scraper!

Designed for use with the smaller 35 to 50 H.P. industrial type tractors, the 4-yard Continental is the same in general design and operation as the well-known Continental 5, 7 and 10 yard Wagon Scrapers.

It uses the same quality materials throughout and is equipped with the Continental Be-Ge Standard Hydraulic Power Control. Of course, it has the full stability of two-wheel design that enables all Continental Wagon Scrapers to back easier, load and dump faster, make faster turns and require less tractor power!

The Continental Junior is the lightest Scraper made per yard of capacity, yet it's strongest in construction. It features a wide opening "fool-proof" rear gate.

& other Continental features:

1. Lightest in weight, yet strongest!
2. Simplest in design and all working actions!
3. Require less tractor power!
4. Backfill entirely over a bank!
5. Dump in close quarters!
6. Turn short and back easily!
7. Load, dump and haul faster!
8. Used for spreading and grading, too!

There are numerous operations where a 4-yard Continental Wagon Scraper works out more satisfactorily, particularly where only small horsepower tractors are available, and it is for such applications that Continental engineers, always alert to the needs in the field, have developed the Junior Model which fully rounds out the Continental Line of Wagon Scrapers consisting now of 4, 5, 7 and 10 yard Wheeled Scrapers and 5, 7 and 10 yard Crawler-Track Mounted Scrapers.

Continental Wagon Scrapers are the fastest, lowest cost dirt-moving equipments made. They "hog out" the toughest clay, hard pan, rocky soil, gummy materials, rocks, tree roots and any other embedded obstructions that the tractor will pull through. They backfill over a bank or into water, and dump like a truck, eliminating the need for bulldozing. They are used, too, for hauling, spreading, grading and filling; and are the most flexible, easy to operate Wagon Scraper available today.

Use Continentals on the toughest jobs — for long or short hauls — you'll move more yards for less dollars with Continentals! Write for Bulletin No. 107 on the new Junior Model CS4A.

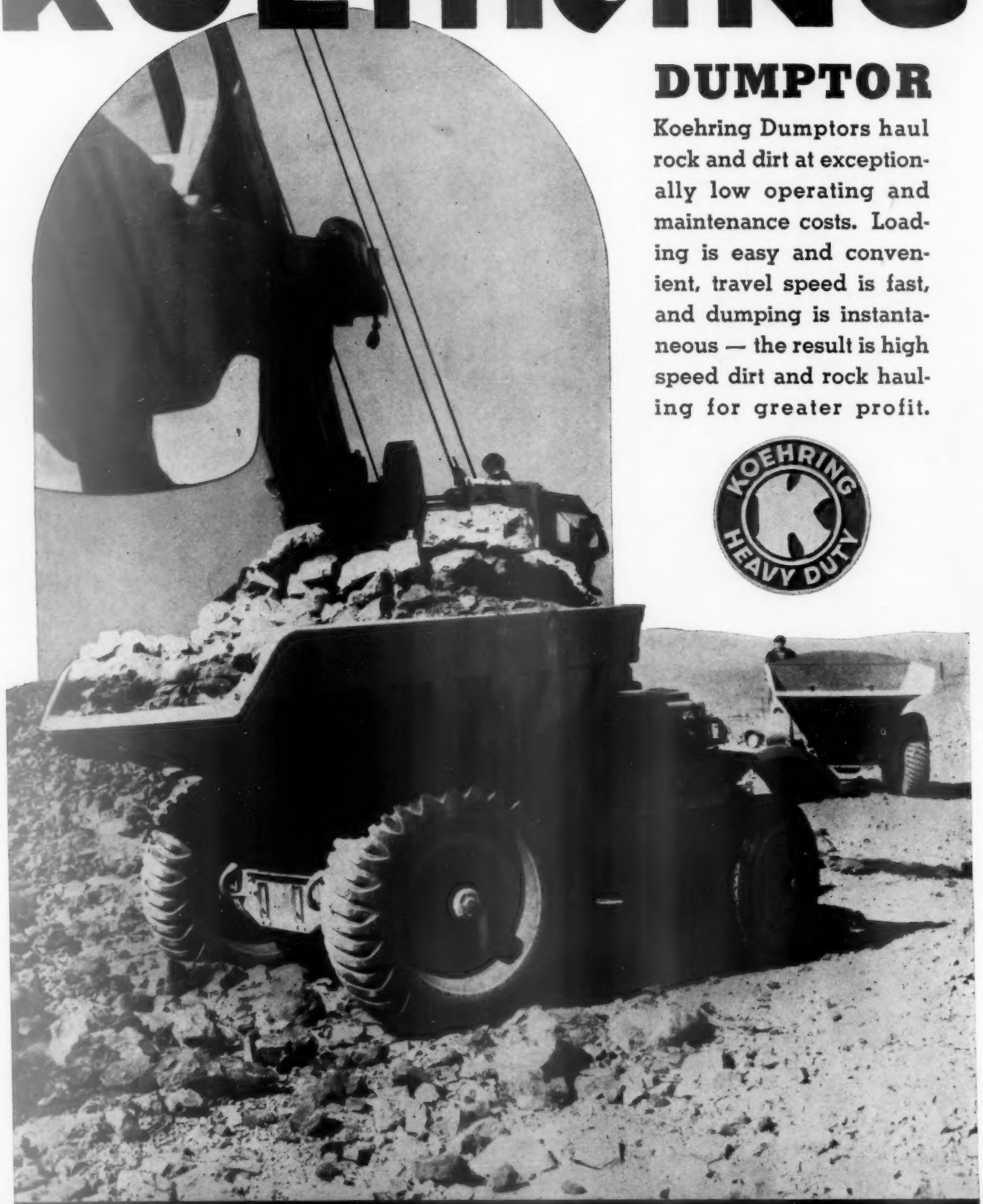
CONTINENTAL ROLL & STEEL FOUNDRY COMPANY
Tractor Equipment Division
14400 Railroad Avenue
East Chicago, Indiana

CONTINENTAL WAGON SCRAPERS

KOEHRING

DUMPTOR

Koehring Dumptors haul rock and dirt at exceptionally low operating and maintenance costs. Loading is easy and convenient, travel speed is fast, and dumping is instantaneous — the result is high speed dirt and rock hauling for greater profit.



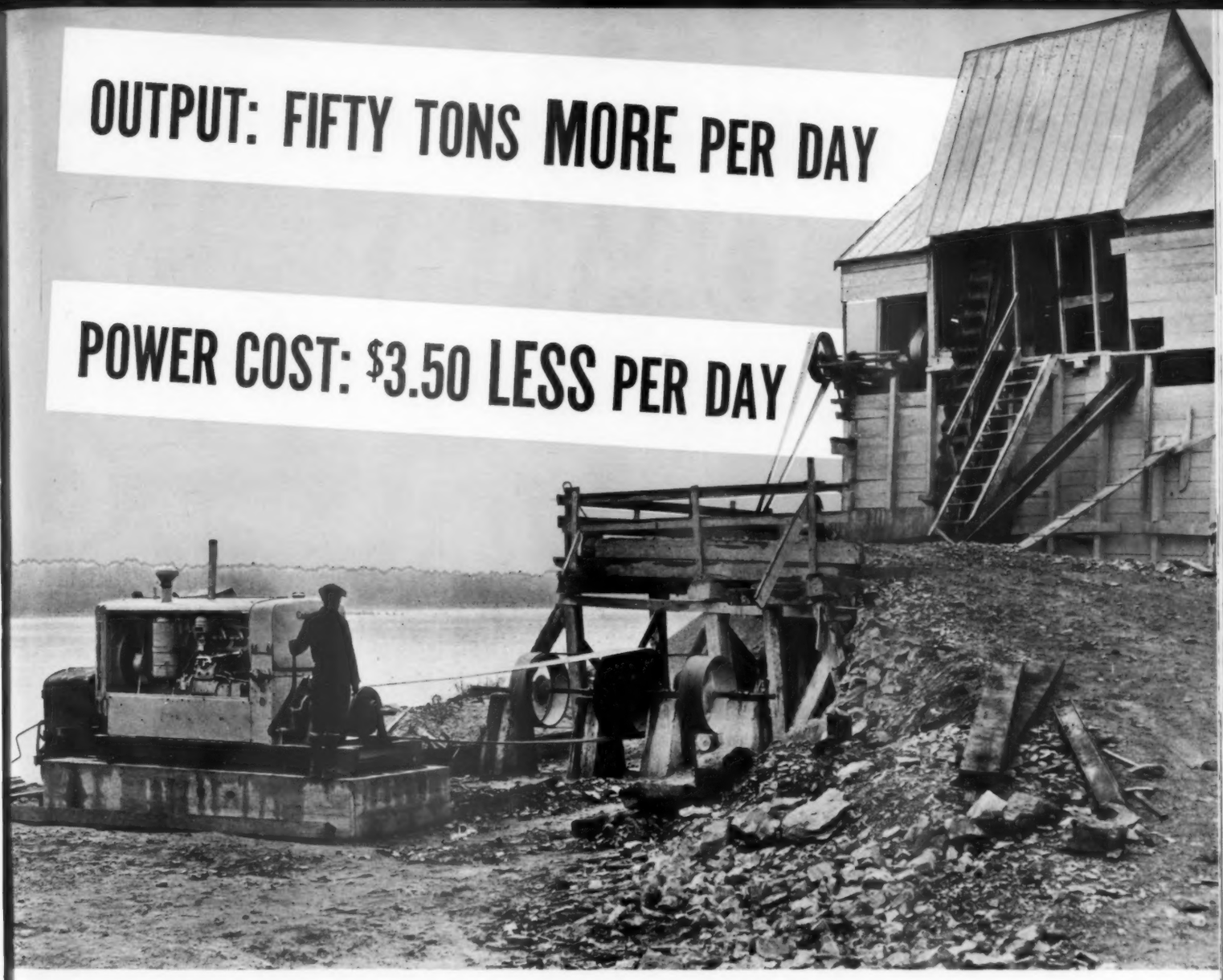
KOEHRING COMPANY

Pavers · Mixers · Shovels · Cranes · Draglines · Dumptors · Mud-Jacks

3026 WEST CONCORDIA AVENUE, MILWAUKEE, WISCONSIN

OUTPUT: FIFTY TONS MORE PER DAY

POWER COST: $3.50 LESS PER DAY



HARD to believe, but the above is exactly what happened when the St. Charles (Missouri) Quarry Company substituted a 125-hp. "Caterpillar" Diesel Engine for the power-plant formerly used. It's an even stranger story:—

Not only has this new type of power increased the plant's output from 200 to 250 tons per 10-hour day, and reduced the cost of power from $6 to $2.50 per day . . . but it still provides enough additional power to enable adding an air compressor and a 29-kw. generator.

When facts like these confront rock-crushing and gravel-screening plant owners, it's time to investigate industry's cheapest type of power. Any "Caterpillar" dealer will gladly survey *your* power needs and give you a conservative estimate of what you should be able to save under conditions in your own locality and plant set-up. Or, write to us.

CATERPILLAR DIESEL ENGINES

REG. U.S. PAT. OFF.

CATERPILLAR TRACTOR CO., PEORIA, ILL. . . . WORLD'S LARGEST MANUFACTURER OF DIESEL ENGINES

All Set for Low-cost Production

with G-E Motors Assuring Continuous Operation

G-E motors driving equipment in the lime plant of H. E. Millard

THE new lime plant of **H. E. Millard** at Annville, **Pa.**, is all set for the low-cost production of high-quality lime. The plant machinery is of the most modern, efficient design, and the G-E motors that drive it help to assure continuous operation.

Most of these motors, operated by G-E matched control, are standard open types. Experience has shown that even where there is dust and vibration, the strong frames and end shields, the unusually protective insulation on the windings, and other features of construction enable G-E standard motors to give dependable, economical service on the toughest kinds of jobs.

You may be considering installing new equipment in your own rock-products plant—such as that illustrated here or of a kind to fit your particular requirements. For complete information about the electric equipment to operate it, call the nearest G-E representative. General Electric, Schenectady, N. Y.

011-255

GENERAL ELECTRIC

NOW!

Measured AIR

EVERY INCH OF POWER FROM EVERY FOOT OF AIR — Thor

Brings

FASTER DRILLING at LOWER COST with THOR SUPER-DUTY ROCK DRILLS

Here's a new principle put to work in Thor Rock Drills . . . a principle of valve operation that is radically different in construction and results.

This new, exclusive Thor principle of "Measured Air" enables you to get "Every Inch of Power . . . From Every Foot of Air". The Thor short-travel, positive, tubular valve cuts in and out quicker than any other valve now in use and admits a precisely governed, unvarying quantity of air in back of the piston hammer so that it functions perfectly on every stroke. This uniform operation assures smoother performance and the rapid valve action enables Thor Rock Drills to utilize effectively all the air that enters the machines.

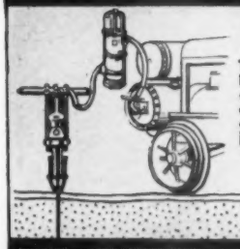
"Measured Air" consolidates in Thor Rock Drills ALL FOUR basic features that mean super-duty performance and amazing air economy. You can prove this yourself on your own work. Before you buy another rock drill, test the Four-Features illustrated at the right. A Thor Representative will gladly arrange a trial and you will see why Thor Rock Drills with "Measured Air" give you "Every Inch of Power . . . From Every Foot of Air".

Thor Representation is widespread, with branches, dealers and service stations in every principal city and mining center.

ONE OF THE MANY THOR ROCK DRILLS

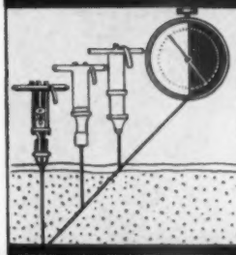
TOOL MAKERS — Thor — SINCE 1893

BASIC 4 FEATURES



TRUE ECONOMY . . . Put a Flow-Meter in the air line and watch air consumption drop when a Thor drill goes on the job!

LOWER AIR CONSUMPTION

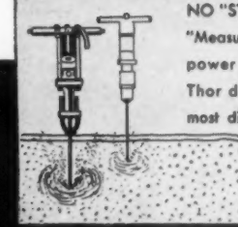


30-SECOND PROOF . . . Make a Stop-Watch Test of any drills under your own drilling conditions . . . and watch Thor outdrill them all!

FASTER DRILLING SPEED

DIRECT PRESSURE . . . Thor design directs blowing power by the simplest method . . . wastes no air . . . blows the hole clean and the cuttings clear.

GREATER BLOWING POWER



NO "STUCK" STEELS . . . "Measured Air" brings EXTRA power for positive rotation. Thor drills keep going in the most difficult formations.

MORE POWERFUL ROTATION

INDEPENDENT PNEUMATIC TOOL CO.

600 WEST JACKSON BLVD., CHICAGO, ILLINOIS

COCHISE ROCK DRILL MFG. CO. Division 6200 E. SLAUSON AVE., LOS ANGELES, CAL.

Birmingham, Ala. Detroit, Mich. Philadelphia, Pa. Toronto, Ont. Boston, Mass. London, England Pittsburgh, Pa. Buffalo, N. Y. Milwaukee, Wis. St. Louis, Mo. Cleveland, Ohio New York, N. Y. San Francisco, Cal.

STEEL CONVERSION IS A REGULAR PART OF TIMKEN ROCK BIT SERVICE

Timken Authorized Conversion Shops make it easy for you to have any size and footage of round or hexagon steel converted quickly and economically.

Timken Authorized Conversion Shops are operated in conjunction with Timken Rock Bit Distributors. They are completely equipped with the special machines, dies and tools necessary for this work and employ only trained and experienced operators. Every shop is under the constant supervision of Timken conversion engineers thus assuring consistently high quality, uniform workmanship and low cost.

In addition to providing adequate facilities for the conversion of your existing steel, Timken Authorized Conversion Shops are prepared to furnish new steel for TIMKEN Bits—round or hexagon—in any diameter and footage.

There is a Timken Rock Bit Distributor and Authorized Conversion Shop at the other end of your telephone. Write for name and address.

HIAWATHA, Timken Bearing Equipped streamlined flyer of the Milwaukee Road

THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO

Manufacturers of Timken Tapered Roller Bearings for automobiles, motor trucks, railroad cars and locomotives and all kinds of industrial machinery; Timken Alloy Steels and Carbon and Alloy Seamless Tubing; Timken Rock Bits; and Timken Fuel Injection Equipment.

TIMKEN ROCK BITS

Specify A ROCK SHOVEL

and you won't have to worry about output when you handle dirt

GASOLINE • ELECTRIC • DIESEL • OIL

Built in a range of 18 SIZES 3/8 yd. capacity and Larger

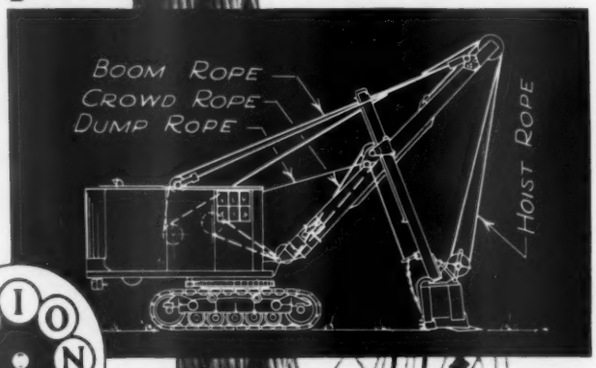
THWEST ENGINEERING CO., 1822 Steger Bldg., 28 E. Jackson Blvd., Chicago, Ill.

NORTHWEST

Save Money

by using the correct UNION Ropes

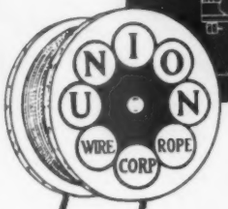
Diagram shows the wire ropes used on one type of revolving shovel. Different makes of shovel have different rope requirements. In writing for recommendations of our engineers, give full classification data covering each machine you are using.



Saving money, by using the wire ropes especially suited to each service, is not a "theory." It is plain common sense.

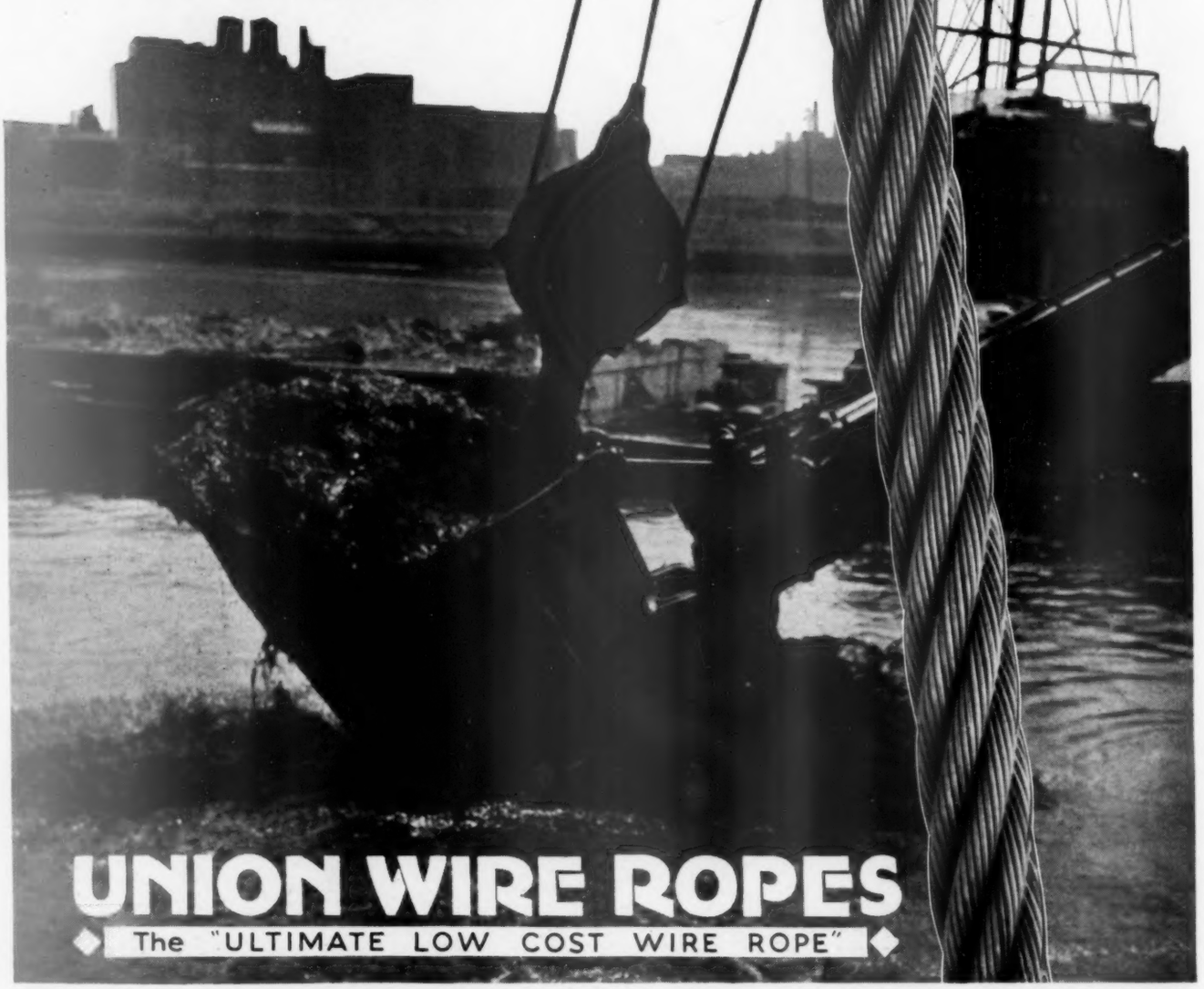
All you need to do is to equip each of your machines with the UNION Ropes of strictly correct size, construction and grade. These properly selected ropes will deliver maximum service, and your saving on rope expense will be substantial.

UNION Wire Rope Engineers will gladly recommend the correct UNION Ropes for your equipment.



UNION WIRE ROPE CORPORATION

General Office and Factory: 21st and Manchester, Kansas City, Mo.
Chicago District Office and Warehouse: 431 West Pershing Road.
Telephone Harrison 8700
Portland, Ore.: 2415 N. W. 22nd Ave.
In Mexico: E. O. Chapa, Calle Dumas Sur 13, Tampico—Madero 2, Mexico D. F.
Export Agents: Lucey Export Corp. (Exclusive)
3505 Woolworth Bldg., N. Y. Broad St. House, London, E. C. 2, England
Distributors in Leading Cities throughout the Country



UNION WIRE ROPES

The "ULTIMATE LOW COST WIRE ROPE"

To empty stockhouse bins efficiently and quickly

Something to think about . . . the many advantages to be gained by transporting cement and other dry pulverized materials from flat-bottom stockhouse bins and warehouse storage with the new Fuller-Kinyon Automatic Remote-Control Unloader. Some of these advantages are:

Speed—Minimum of time required for conveying.

Safety—Remote control keeps the operator out of the bin; out of danger from slides of material.

Minimum amount of dust—The Unloader creates very little dust in operation.

Operates at full capacity at all times—Slides of material do not affect operation; Unloader functions at full efficiency even when buried underneath material.

A transport system such as this may be the solution to some conveying problem you have. It may mean a saving you have been looking for. At least, it will cost you nothing to find out. Our engineering department will be glad to make studies of your problem and recommend an arrangement best suitable for your needs.

FULLER COMPANY
CATASAUQUA, PENNSYLVANIA
Chicago: 1118 Marquette Bldg.
San Francisco: 320-321 Chancery Bldg.

P-25

FULLER-KINYON, FLUXO, AND AIRVEYOR CONVEYING SYSTEMS · · · ROTARY FEEDERS AND DISCHARGE GATES
ROTARY AIR COMPRESSORS AND VACUUM PUMPS · · · AUTOMATIC BATCH WEIGHERS · · · BIN SIGNALS

SKF-EQUIPPED BUILT BY UNIVERSAL VIBRATING SCREEN CO.

Screen PERFORMANCE PROVES THE VALUE OF SKF

IT TAKES A HEAVY duty bearing to resist intensive vibration as this Universal Heavy Duty Vibrating Screen produces up to 120 tons of evenly graded material per hour. It takes an SKF Bearing to do this job, and do it with a minimum of attention and low power consumption.

SKF Ball Bearings on the eccentric shafts operate at 1800 r.p.m.—always giving the same good performance that has led Universal to prefer them since 1920. Remember this: on a screen or a crusher, there is no substitute for SKF.

3926

SKF INDUSTRIES, INC., FRONT ST. & ERIE AVE., PHILA., PA.

MORE THAN
1200
TYPES AND SIZES
Industry comes to SKF for unbiased bearing counsel because SKF makes practically all types of anti-friction bearings.

SKF

BALL AND ROLLER BEARINGS

THE most exacting basis for judging wire rope performance is AVERAGE SERVICE.
This is the basis advocated by Roebling, in which rope cost per ton of material handled, or per other unit of service measurement, is based not on the service of a single rope but on the *average* service of several ropes.
John A. Roebling's Sons Co., Trenton New Jersey
TRADE MARK
JAR
REG. U.S. PAT. OFF.
Roebling...
The pacemaker in wire rope development

CLEVELAND DRILL RIG *Wins* ANOTHER BATTLE OF BULL RUN

★ Down in the Old Dominion State, less than thirty miles from the Nation's Capital, there were fought during the Civil War of the sixties two of the bitterest battles of the four years' struggle. In a hundred-year-old quarry located on the historic battlefield of Bull Run, a Cleveland DR6 wagon drill recently fought another battle — against heavy odds — and won magnificently! The figures for the day . . .

The other drill put in 89 feet of hole, using 70 detachable bits

The Cleveland drilled 128 feet in the same time, requiring only 48 bits.

Cleveland Drill Rigs will win for you too, on any battlefield, and against all competition. Demonstration whenever and wherever you say. The DR6 is fully described and illustrated in Bulletin 111, sent on request.

An interesting side light on the first battle of Bull Run pertains to the large number of civilian spectators who followed the Federal army out of Washington when the advance was ordered. Senators, congressmen, other public officials, and government workers — even gaily dressed ladies — drove out to witness the first struggle of the war. Their carriages blocked roads and bridges, greatly impeding the movement of the troops. Many of the civilians were killed and wounded, and Confederate soldiers feasted for three days on the fried chicken lunches the picnickers had brought out to sustain them in their day of entertainment!

THE CLEVELAND ROCK DRILL COMPANY

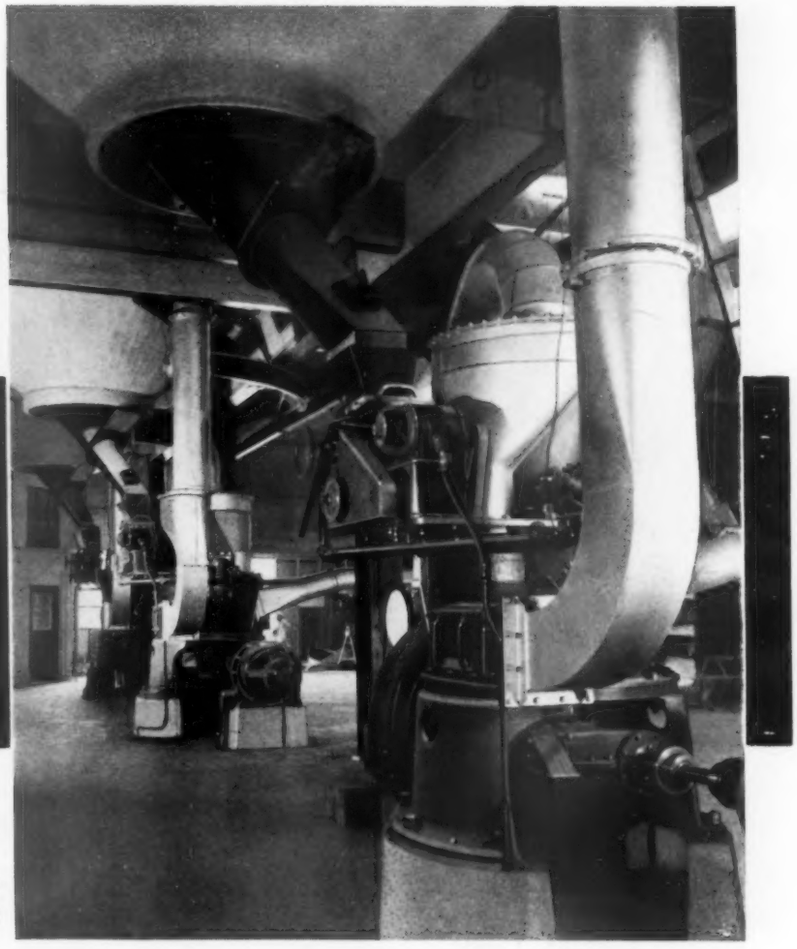
3734 EAST 78TH STREET • CLEVELAND, OHIO

Cable Address: ROCKDRILL

LEADERS IN DRILLING EQUIPMENT

FOUR BOWL MILLS

DIRECT FIRING CEMENT KILNS



IS the cement industry **sold** on the Bowl Mill method of firing Rotary Kilns?

Definitely **yes,** say operators and engineers, who are consistently specifying Raymond Bowl Mills for modernizing plants throughout the country. You can check up on the outstanding projects in the cement field . . . if they are the latest word in construction and equipment, you can be sure they use Bowl Mill Firing.

The installation shown above is in the Midwestern Plant of a nationally known concern.* Each of the four kilns is direct-fired by individual Bowl Mills, each unit pulverizing about 6600 lb. of coal per hour. This method replaces the former central bin system at a big saving in costs and with greatly increased capacity.

In its various other plants, this company operates a total of **ten** Bowl Mills and **six** Raymond Mechanical Air Separators . . . ample evidence of its efficient methods of production.

*If you wish to see the smooth running efficiency of the Raymond Bowl Mill, we will furnish on request the name and location of cement plants using this equipment.

Write for copy of Bowl Mill Bulletin

RAYMOND BOWL MILL

RAYMOND PULVERIZER DIVISION
COMBUSTION ENGINEERING COMPANY, INC.
1321 North Branch Street **CHICAGO**
Sales Offices in Principal Cities • • • In Canada: Combustion Engineering Corporation, Ltd., Montreal

Cordeau is insensitive

● When Cordeau-Bickford Detonating Fuse eliminated the detonating cap from the bore hole, another old-time hazard went by the board. Large-scale loading operations extending over long periods may now be carried on with comparative security, because the detonation of each load is accomplished by a length of this insensitive fuse in direct contact with every cartridge. Only when the job is ready for firing is a blasting cap attached to the main line of Cordeau.

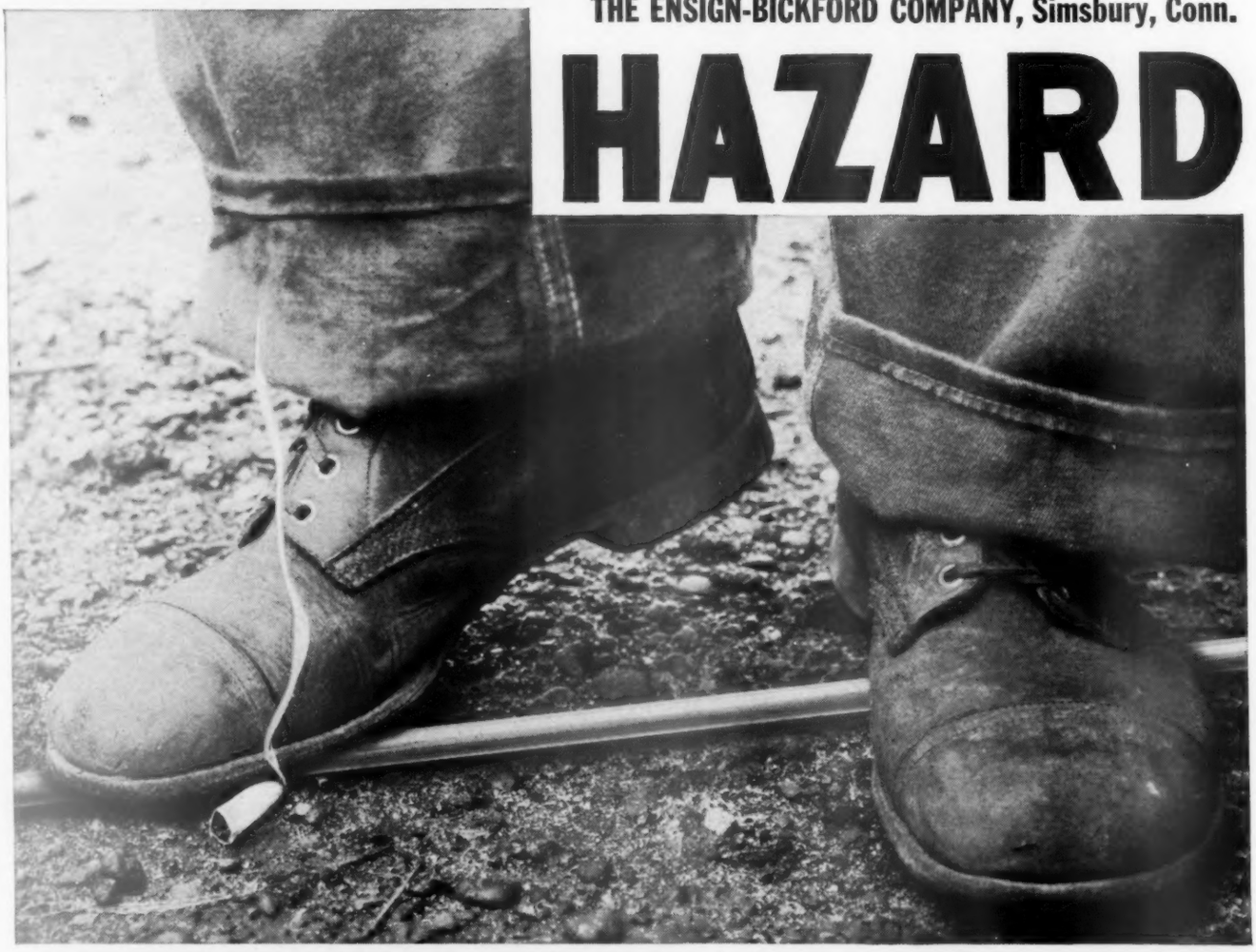
Correct use of Cordeau reduces to a minimum the risk of burned holes or danger from unexploded caps and powder after firing. Cordeau safeguards your investment of time and money—and it cuts down the hazards of blasting operations.

LESS

CB64

THE ENSIGN-BICKFORD COMPANY, Simsbury, Conn.

HAZARD



CORDEAU-BICKFORD Detonating Fuse

UNPARALLELED PERFORMANCE

LIMA has won nation wide recognition on a wide variety of jobs--road building, metal mining, steel erection and material handling, levee work, coal stripping, general construction, brick making, lumbering, conservation work, quarry operations, and sand and gravel production. These varied jobs present many difficult digging problems, but without exception LIMA comes through with unparalleled performances.

WON FOR LIMA FIRST PLACE ON A WIDE VARIETY OF JOBS

follow the trend

LIMA

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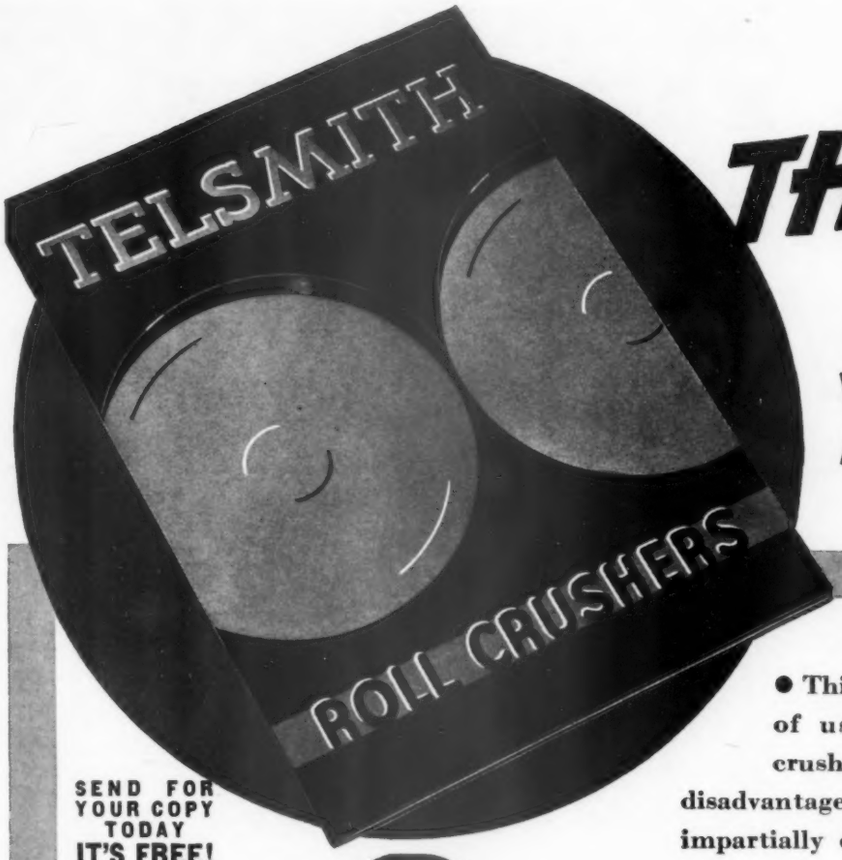

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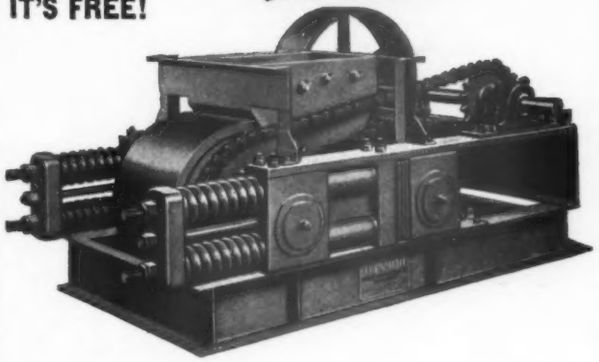

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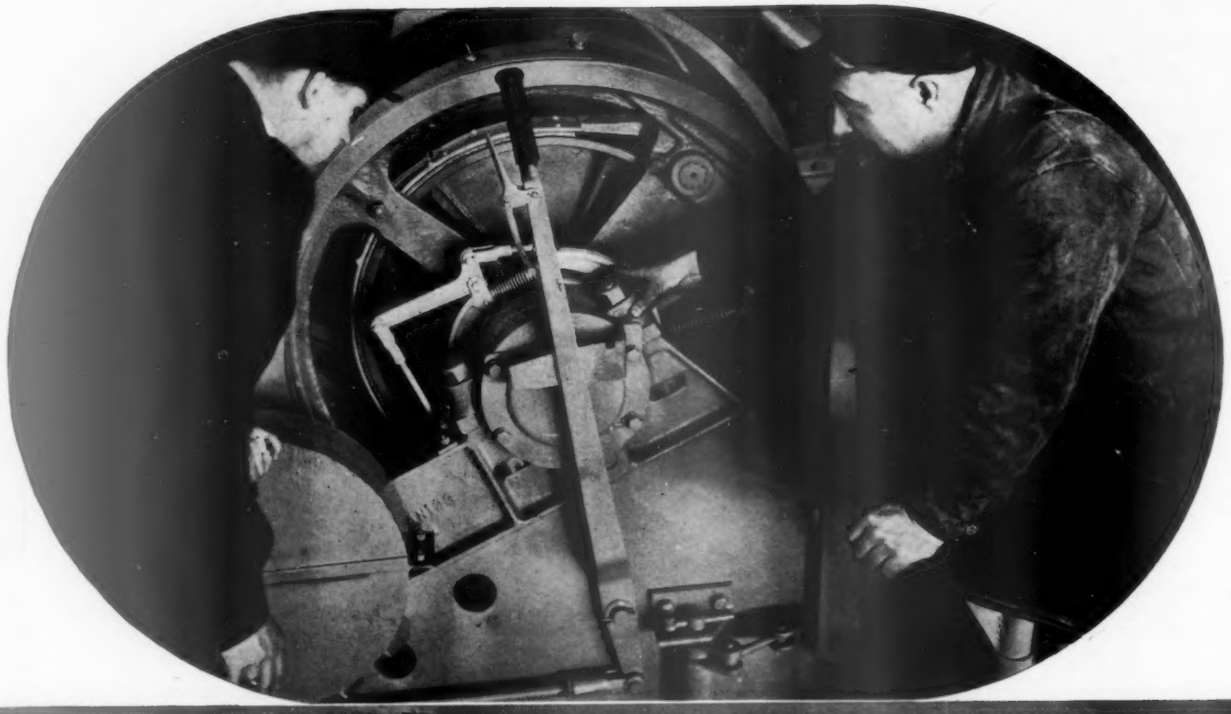

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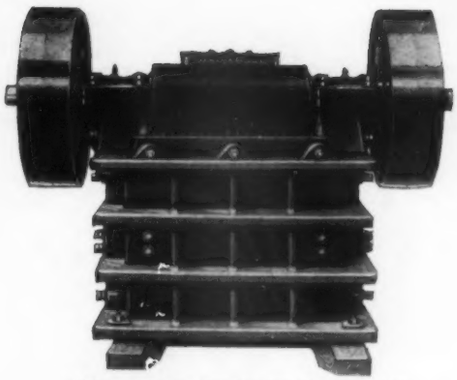

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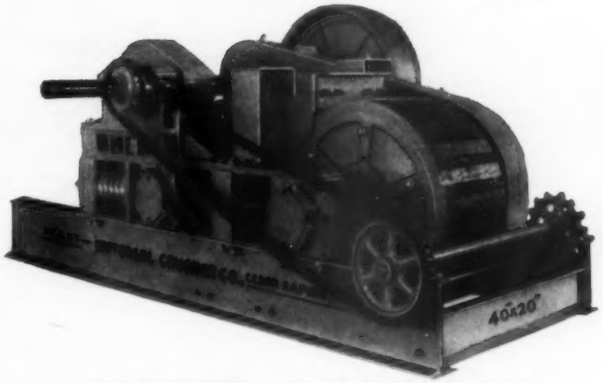

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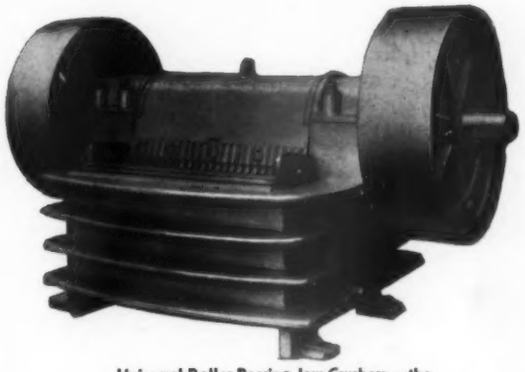

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PIT AND QUARRY

Vol. 30 September, 1937 No. 3

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CONTENTS

News of the Industry.....27

Editorial: The Fruits of Competition.....34

Gibsonburg Lime Plant Adds Five Vertical Kilns 36

News and Views from the Capital.....40

Washing Plant of Southern Phosphate Corp. Sets New Standard for Industry.....41

The Future of Labor Relations.....49

Vibrating Device for Drying Cement Paste..51

No Quarry in the U. S. A. Farther South Than This 53

Swimming Pool and 50 Children Hold Gravel-Operator R. E. Carr's Interest 56

Profits from Concrete Burial Vaults.....58

Columbus Concrete Producer Adds Second Batching Plant 61

Men of the Industry.....66
Personal Mention 68
Traffic News Digest.....70
Foreign Developments 72
Occupational Diseases and the Law....73
New Machinery and Supplies.....74

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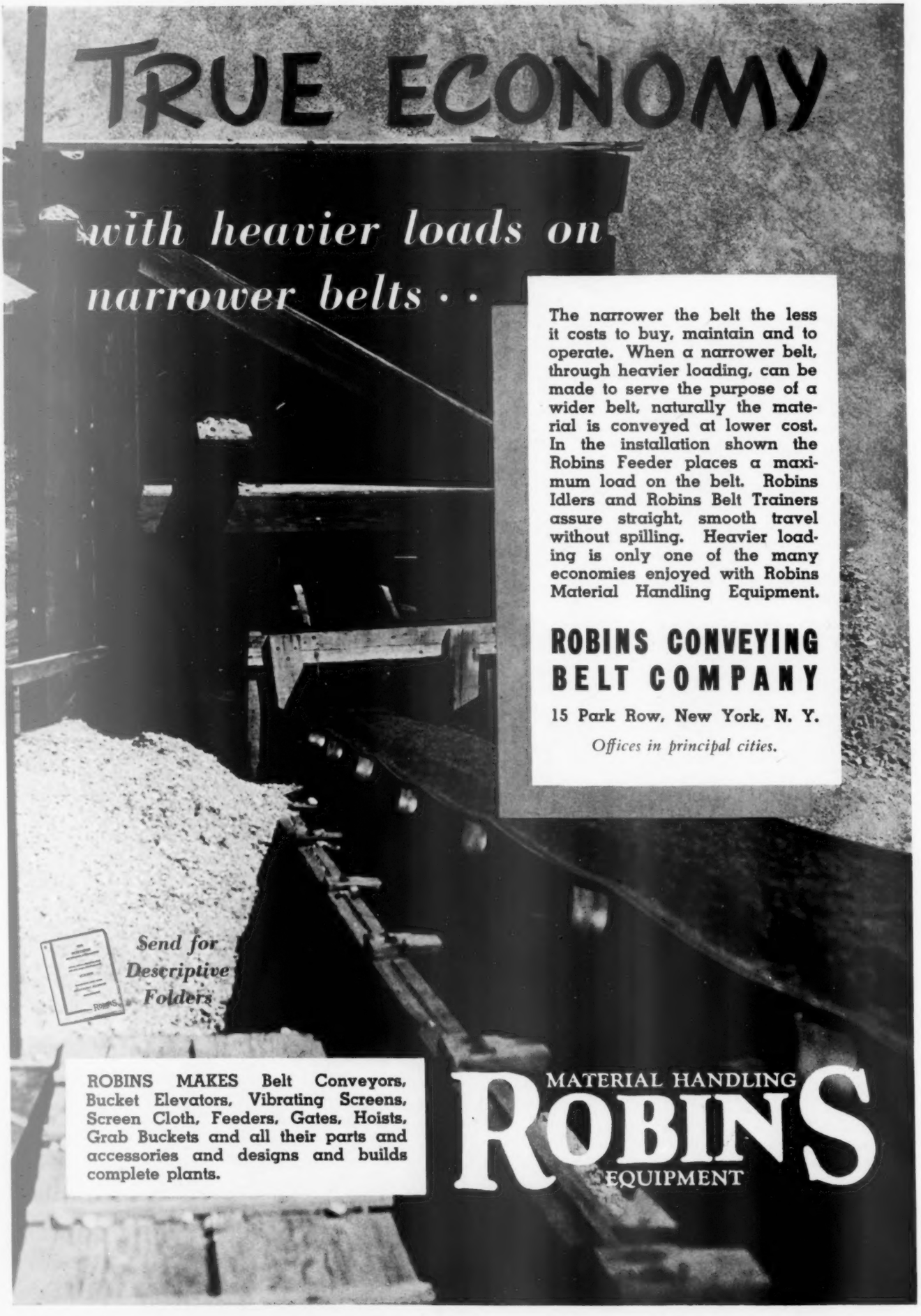
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PIT AND QUARRY

CHICAGO SEPTEMBER, 1937

Frank H. Smith Dies of Pneumonia at 68

PROMINENT IN CEMENT INDUSTRY

Frank H. Smith, president of the Lawrence Portland Cement Co. and a prominent figure in the cement industry, died of pneumonia on Aug. 11 at his home in Plainfield, N. J. at the age of 68.

Mr. Smith was a native of Pawcatuck, Conn. He had made his home in Plainfield for more than a half century. He became associated with the Lawrence Portland Cement Co. in 1908 and had served as its president since 1922. He was president of the Portland Cement Assn. for the two-year period of 1929-1930.

Frank H. Smith.

Active in New Jersey politics, he was Commissioner of Banking and Insurance from 1917 to 1920 and again from 1929 until 1932. He was a director of several banks and investment companies.

Mr. Smith is survived by his widow, Mrs. Charlotte Loeser Smith. Funeral services were held Aug. 12 and burial took place in Hillside Cemetery, Plainfield.

Removes Rotary Kiln to Cement Mill at Fredonia

★ The 240-ft. rotary kiln at the Mildred, Kan., plant of the Consolidated Cement Corp., now being dismantled, has been shipped to the corporation's plant at Fredonia, Kan., and is being erected to go into service shortly.

Other improvements at the Fredonia plant to be undertaken in the near future include the erection of a 175-ft. stack.

Earth Producer Ceases Operations in Oklahoma

Decline in the demand for its products, particularly for fullers' earth, has caused the Thurber Earthen Products Co. to cease operations at its Woodward, Okla., plant.

The company has been released from its lease on the deposits and is selling the equipment. Fullers' earth, once in great demand by the oil refineries, has been replaced in recent years to a large extent by artificially-activated earths made from bentonite and by acid-sprayed earths. The trend in refineries away from percolation methods and toward contact methods is also responsible to some extent.

Diversion Penalty May Affect Massachusetts

The penalty of the Hayden Cartwright Act may be invoked against Massachusetts because of the diversion of special highway revenues to other than highway purposes, according to press reports from Boston. It is estimated that if the penalty is invoked the loss to the state in Federal aid may amount to about $3,000,000.

Construction Climbs to New High Level

JULY WORK AT RECOVERY PEAK

With the July record once again construction has established a new high level for the recovery. According to figures of F. W. Dodge Corp., the July total for all classes of construction amounted to $321,602,700 in the thirty-seven eastern states, topping the previous high figure of the recovery reported in June of this year in the amount of $317,842,100 and representing an increase of 8 per cent. over the total of $294,734,500 reported in July, 1936.

Of the July 1937 volume, $81,046,000 was for residential building, $138,063,500 for non-residential building, and 102,493,200 for civil engineering projects, *i. e.*, public works and public utilities. The residential total compares with $71,993,700 for July 1936 and $93,078,100 for June of this year. The July 1937 non-residential total was about 44 per cent. greater than the total for July of last year and exceeded the June, 1937 total of $124,837,000 by about 10 per cent. Civil engineering projects started in July fell materially below the figure of $126,615,600 shown for a year ago and were only little better than the total of $99,927,000 shown for June of this year.

For the first seven months of 1937 the total volume of construction undertaken in the thirty-seven eastern states reached $1,815,253,900; this was an increase of 19 per cent. over the total of $1,532,075,300 for the corresponding seven months of last year. Of the 1937 cumulative volume residential building amounted to $597,452,500; for the corresponding period of 1936 residential building totaled $406,838,300.

Predict Cement Sales of 125,000,000 Barrels

IMPORTS A THREAT IN THE EAST

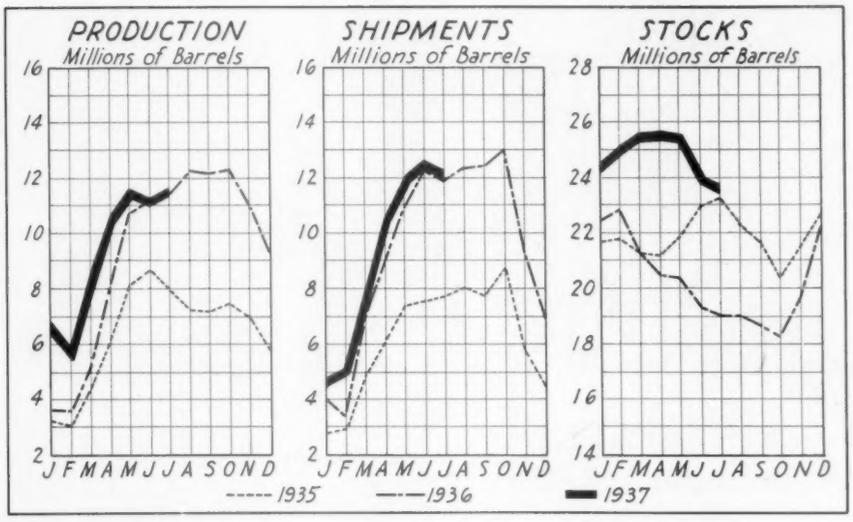
After experiencing the most prosperous initial half year since the pre-depression era, Portland-cement producers now are looking forward to further moderate gains in the volume of shipments during the final six months. Sales for the entire year of between 125,000,000 and 130,000,000 bbl. are confidently expected by the trade. Such figures would represent an increase of between 12 and 15 per cent. over the 112,500,000 bbl. shipped during 1936, which in turn represented an advance of 50 per cent. over the 74,815,000 bbl. sold in 1935.

Results of the operations of the leading cement producers being made public illustrate the progress made over a year ago. Lone Star Cement Corp., the only important company making other than a 12 months return, for the initial half of 1937 reported net of $1,924,437, equal to $1.99 a share on its outstanding stock. This compared with $1,215,285, or $1.79 a share for the like 1936 period. The results of this concern, however, are not entirely indicative of the industry in that Lone Star realizes important earnings from the operation of subsidiaries in Argentina, Uruguay and Brazil.

Lehigh Portland Cement Co. for the 12 months ended June 30, last, showed a net of $1,910,428 as compared with a net of $1,170,857 in the preceding similar period. Alpha Portland Cement Co. reported a net of $690,980 for the 12 months as compared with a profit of $259,907 before federal income taxes in the previous like period, while Pennsylvania-Dixie Cement Corp. changed a net loss of $618,397 in the 12 months ended with June 30, 1936, into a profit of $198,002 before federal income taxes for the like months ended this year.

Aside from the threat of constantly advancing imports further affecting the price structure along the Atlantic and Gulf seaboards and contiguous territory, producers foresee no important change in quotations at the present time. In contrast to the constantly advancing trend of prices of practically all other building materials, Portland-cement quotations on the whole have shown little or no change in more than three years. The exception to this rule has been a lowering of prices on the seaboard forced by foreign competition.

Last December a reduction ranging from 12c. to 63c. a barrel was put into effect along the affected coastal areas, but despite this move the foreign product continues to enter in ever-increasing volume. It is estimated that in the initial five months of 1937 the price reduction entailed a decline in revenue to domestic producers shipping to the coastal markets of over $1,200,000. Belgium has been the leading shipper of cement here, followed by Denmark, Germany and the Netherlands. Other countries include the United Kingdom, Norway, Poland and Danzig, Jugo-Slavia and Bulgaria, with Japan active in Hawaii and making small shipments to the Pacific Coast.



The Portland-cement industry in July, 1937, produced 11,597,000 bbl., shipped 12,237,000 bbl. from the mills, and had in stock at the end of the month 23,371,000 bbl. Production and shipments of Portland cement in July, 1937, showed increases of 0.8 and 3.5 per cent., respectively, as compared with July, 1936. Stocks at mills were 23.2 per cent. higher than a year ago. The mill value of the shipments—52,539,000 bbl.—in the first half of 1937, is estimated as $78,999,000. According to the reports of producers the shipments totals for the first half of 1937 include approximately 1,596,000 bbl. of high-early-strength Portland cement with an estimated mill value of $3,000,000.

PCA Advances Anderson, Catton and Copeland

Following the elevation of Frank T. Sheets to the presidency of the Portland Cement Assn. which becomes effective on Sept. 1, A. A. Anderson will assume the administrative responsibility for the direction of the Highways and Municipal Bureau. M. D. Catton will be in charge of development work relating to railways and highways, including the association's work in promoting soil-cement roads. Work in regard to the development of housing structures and related subjects will be in charge of R. E. Copeland.

★ Two Austin-Western crushers have gone into service at the plant of the West Jefferson Sand & Gravel Co., West Jefferson, O.

Profitless Quarry Quits Business After Strike

For a number of years the Dolcito Quarry Co., Tarrant City, Ala., has shown little or no profit. The plant was kept operating, however, chiefly to provide a living for the 100 employees, many of whom had been with the company for years.

With the spread of the labor movement, the employees joined a union and went on strike. The company's officials waited a month, then decided to go out of business. The property has been fenced in, officials have announced the plant will never reöpen and plans are going forward for the disposal of the equipment.

Many Plants Installing Dust-Arrestor Systems

★ According to the Northern Blower Co., Cleveland, O., Norblo dust-collectors have recently been installed in the following plants: California Portland Cement Co., Colton, Cal.; Ash Grove Portland Cement Co., Chanute, Kan.; Missouri Portland Cement Co., St. Louis, Mo.; General Crushed Stone Co., Auburn, N. Y., Jordanville, N. Y. and Worcester, Mass.; Colorado Feldspar Corp., Canon City, Colo.

★ The General Crushed Stone Co., Easton, Pa., has just purchased a fleet of Phoenix 10-cu. yd. semi-trailers from the Easton Car & Construction Co. They will be used at the company's Rock Hill quarry near Quakertown, Pa.

New lime-putty plant of Ever-Ready Mixed Mortar, Inc., which recently began operating at Houston, Tex. It is one of the many installed in the past year or so under Brooks-Taylor patents. This is said to be the first installation west of the Mississippi River.

Another Lime Operation Planned for Bellefonte

Operations looking toward the opening of a large limestone quarry have been started near Bellefonte, Pa., by the Oak Hall Limestone Co., Inc., according to H. P. Hassinger, president of the company.

The company plans to erect a commercial-stone and lime operation. A new and modern rotary kiln will be erected in the near future, it is reported.

ASTM Seeks to Revise Cement Specifications

The A. S. T. M. will shortly submit a proposal for the revision of Standard Specifications for Portland Cement and Standard Method of Test for Voids in Fine Aggregates for Concrete. Action in this direction was taken at the June meeting of the society.

Two committees—C-3 on brick and C-10 on hollow-masonry building units—have now been merged into a single committee on manufactured masonry units designated as Committee C-15.

Erects 20,000-Ton Bin for Storage of Agstone

★ The Carbon Limestone Co., Youngstown, O., recently erected the largest agricultural limestone bin east of the Mississippi River, according to company officials.

The bin, 90 ft. by 150 ft. by 25 ft. will hold 20,000 tons of pulverized limestone. Six screw-conveyors run lengthwise through the concrete-and-steel bin. They can move 250 tons of limestone per hour, keeping the loading bins filled for truck service.

The loading bins are equipped with batch weighers.

Monsanto to Furnish Phosphates to T.V.A.

Sintered phosphatic materials, processed in the Monsanto Chemical Co. plant in Maury County, Tenn., will be supplied the Tennessee Valley Authority by the Monsanto company, according to a recently awarded contract.

The company will mine from T.V.A. property near the plant. The muck thus obtained will be sintered and the plate rock and sand shipped to the Authority at Muscle Shoals.

Use of the Monsanto plant makes unnecessary the building of sintering facilities by the T.V.A. This sinter, together with other fine phosphatic materials agglomerated at Muscle Shoals, is to be used by the Authority in its experimental production of plant foods.

The contract is for five years, beginning July 1, 1937.

Steady Demand for Sand, Gravel at Evansville

Owing to the great amount of building in Evansville, Ind., and other counties in the tri-state section, the demand for sand and gravel is better than it has been for several years past. Gravel fleets along the Ohio River, as well as those along the Wabash and White Rivers are being operated steadily. Prices for both sand and gravel are advancing along with other prices for building materials. It is expected that building operations in Evansville will continue active until late in the fall or early in the winter.

Company Unions Formed by Operating Groups

Organizers for the C. I. O. have been unsuccessful in a number of instances recently in plants within the industry, employees having voted instead to form company unions. Among the operations where company unions have been formed are the Universal Atlas Cement Co. Leeds, Ala., plant; Yosemite Portland Cement Co., Merced, Cal., plant; and American Gypsum Co., Pt. Clinton, O., plant.

Crushed-Stone Output 58% Higher in 1936

FINAL FIGURES ARE RELEASED

Sales of crushed and broken stone, which includes riprap, crushed stone for concrete and road metal, railroad ballast, metallurgical stone (fluxing stone), agricultural limestone, refractory stone, and stone for various chemical and manufacturing processes, amounted to 128,952,800 tons valued at $117,374,293 in 1936, an increase of 58 per cent. in quantity and 62 per cent. in value, according to statistics just released by the U. S. Bureau of Mines.

Crushed-stone aggregates for concrete and road metal and railroad ballast amounted to 86,779,820 short tons valued at $81,837,787, an increase of 58 per cent. in quantity and 67 per cent. in value.

Operators of noncommercial plants for concrete and road aggregates produced 29,776,390 short tons of stone valued at $28,434,520, an increase of 79 per cent. in quantity and 96 per cent. in value. All this material was transported by truck.

Commercial plants produced 49,112,350 tons of concrete and road aggregates valued at $47,410,574, an increase of 50 per cent. in quantity and 56 per cent. in value. In 1936 57 per cent. of the commercial output was reported as transported by truck, 30 per cent. by railway, 7 per cent. by water, with 6 per cent. unspecified as to transportation. Corresponding figures for 1935 were, respectively, 56, 33, 10, and 1 per cent.

Total production of commercial aggregates in 1936 (57,003,430 tons including railroad ballast) increased 50 per cent. over 1935 and noncommercial aggregates increased 79 per cent. In 1936 commercial plants furnished 66 per cent. of the total aggregates, noncommercial plants, 34. In 1935 these figures were 70 and 30 per cent., respectively. The average value per ton in 1936 of commercial stone was 97c. against 90c. in 1935; of noncommercial stone 96c. compared with 87c. in 1935. Of the other crushed-stone products, stone for metallurgy (17,724,880 tons valued at $11,576,156) increased 45 per cent. in quantity; agricultural limestone (3,473,710 tons valued at $4,406,603) increased 75 per cent.; refractory stone (1,324,040 tons valued at $1,831,693) increased 53 per cent.

New Phosphate Plant to Buy T.V.A. Power

ELECTRIC RATES ARE REVEALED

The Victor Chemical Works of Chicago, Ill., has started construction of its $1,000,000 plant at Mount Pleasant, Tenn., which will be operated by electric power obtained from the Tennessee Valley Authority. The company owns about 3,500 acres of land in the vicinity containing phosphate-rock deposits.

"The reason that we located our plant at Mount Pleasant," according to August Kochs, president, "was because we could get electric power from the T.V.A. at a lower cost than any other place in the country, with the possible exception of the Niagara Falls district, and even there we could not be sure of being able to get it.

"The T.V.A. power lines run within a few miles of our property, hence we find the Mount Pleasant plant ideally situated for our needs. We discussed power costs with the Public Service Co. of Illinois, but it could not meet the T.V.A. rates.

"We shall process the phosphate rock at Mount Pleasant and transport the phosphoric acid and phosphorus derived in tank cars and trucks to our plant at Chicago Heights for further processing."

The Victor Chemical Works will pay to the T.V.A. the same rates for its electric power as will the Aluminum Co. of America.

Under the terms of the Victor Chemical contract with the T.V.A., 8,000 kilowatts of "firm" power will be made available between Feb. 1 and June 1, 1938. This amount will be increased to 12,000 kilowatts of firm power and 12,000 kilowatts of "run-of-stream" power on or before July 1, 1940, and to 16,000 kilowatts of firm power and 16,000 kilowatts of run-of-stream power on or before July 1, 1941.

"Firm" power is power which must be available for the use of the company at all times, while "run-of-stream" power is power that the T.V.A. will supply only if there is sufficient water available to produce it. For the firm power the company will pay at a rate of $24 a kilowatt year, or 2.74 mills per kilowatt hour, while the run-of-stream power will cost 2.27 mills per kilowatt hour.

The Victor company will not take "dump" power—that is, surplus power for which there is no demand—as the Aluminum company is doing. It is estimated that when it is taking the full contract the cost will be about $500,000 annually. Victor's contract with T.V.A. runs for 20 years, subject to a five-year cancellation clause, which, under the T.V.A. act, must appear in all agreements with private companies.

Bonded Debts a Drain on State Road Funds

Nearly one-quarter of the states have floated such a large volume of highway bonds that payment of interest and amortization charges absorb an important part of current tax revenue, reports the American Petroleum Industries Committee. Sixteen states, however, have no road debt, and consequently are able to utilize their entire current revenue for road improvement.

Standard Silica's Income More Than Doubles 1936

Net income of the Standard Silica Corp. of Chicago, Ill., in the first half of the year is indicated by the company's balance sheet as of June 30, at $61,256, or nearly two and one-third times the $26,177 indicated in the statement for the comparable period of 1936.

On the basis of the 39,389 shares of $10 per capital stock currently outstanding net for the first six months this year was equal to $1.55 per share, as compared with about 66 cents per share on the same basis for the first half of last year.

Erects Feldspar Milling Plant at Denver, Colo.

★ The Western Feldspar Milling Co., Denver, Colo., is constructing a $10,000 mill building at 1333 West Maple Ave., in Denver. The structure is to be completed in September and put into operation for the fall season.

★ A well-equipped machine shop has been added to the plant of the Anna Quarries, Anna, Ill., in charge of George Miller, machinist. In addition to the work of the quarries, the shop is equipped to do acetylene welding commercially.

★ Texas Cement Plaster Co., Oklahoma City, Okla., has made a number of improvements at its gypsum plant, including a new tube-mill with a new type of steel heating jacket.

Seeking Mineral-Wool Deposits in Iowa

FIELDMEN TAKING ROCK SAMPLES

The Iowa geological survey is specializing this summer in locating stone suitable for the manufacture of mineral wool, according to Dr. A. O. Trowbridge, state geologist.

Fieldmen are going over the state collecting samples of limestone. The samples are taken to the University of Iowa chemical laboratory for analysis.

"There is plenty of suitable limestone in Iowa," Dr. Trowbridge states, "but we want to locate it near important trade centers, where, because of better transportation facilities, and larger supply of labor, and of coke and coal, the operation of manufacturing plants would be most practicable."

One plant, owned by the General Insulating & Mfg. Co., is already operating in Iowa. It is located at Dubuque.

Makers of Sand-Lime Building Units Meet

Sand-lime-products manufacturers of the Great Lakes area held an informal meeting at the Olds Hotel, Lansing, Mich., on July 29. Twelve were present at the luncheon and remained to take part in the discussion of various matters of interest.

Lets Contract for Office and Laboratory Building

★ Contracts were let late in August for the erection of a new building to house the offices and laboratory of the new Leeds, Ala., plant of the Universal Atlas Cement Co. The cost of the structure is reported to be about $50,000.

Coogan Gravel Co. Is to Continue Operating

An item in the August issued stated that the Coogan Gravel Co., Peoria, Ill., had been dissolved. P. M. Coogan, head of the company, points out that the dissolution was made to avoid duplication of taxes and the company is continuing to operate as in the past.

★ The Asbury Graphite Co., Asbury, N. J., is installing an 8-ft. Gayco separator, supplied by the Rubert M. Gay Co.

Oct. 8-9 Dates for Illinois Conference

SPEAKERS' TOPICS INTERESTING

Current scientific and industrial developments of special significance to the nonmetallic-minerals industries of Illinois will be the general subject of addresses and papers to be given at the Fifth Annual Illinois Mineral Industries Conference, to be held on the University of Illinois campus, Urbana, Ill., on Friday and Saturday, October 8 and 9.

The meeting is being sponsored by the Geological Survey Division of the Illinois Department of Registration and Education, the Engineering Experiment Station of the University of Illinois, and the Illinois Mineral Industries Committee.

The conference will begin at 11 a.m. on Friday, with an address of welcome by President A. C. Willard of the University of Illinois. Clyde E. Williams, noted director of the Battelle Memorial Institute, Columbus, O., will give the main address at the opening session, speaking on *Research in the Mineral Industries*.

E. J. Krause, president of the Columbia Quarry Co., St. Louis, Mo., and president of the Midwest Agricultural Limestone Institute, will serve as chairman of the Friday afternoon session. The speakers will include W. R. Sanborn, president of the Lehigh Stone Co., Kankakee, Ill., who will discuss the production and possibilities for limestone rubble and ashlar in construction; E. M. DeTurk, professor of soil technology at the University of Illinois, who will point out the need of agricultural limestone on Illinois soils; and Ernest Liebermann, chief of the Illinois Highways Department, who will trace current developments in crushed-stone and stabilized-gravel roads.

S. A. Phillips, vice-president and directing editor, PIT AND QUARRY, will act as chairman of the Saturday-morning session which will be a joint meeting with the clay-products group. The use of geophysical apparatus in prospecting will be described by H. A. Buehler, Missouri state geologist. Magnetic separators and their application in nonmetallic-minerals production will be described by J. J. Ferris, chief engineer of the Dings Magnetic Separator Co., Milwaukee, Wis. J. E. Lamar, geologist of the Illinois State Geological Survey, will tell of unexploited and little-known industrial minerals in the state. The results of a study of methods for bleaching non-carbonate minerals of Illinois will be summarized by J. S. Machin, chemist, Illinois State Geological Survey.

On the social side, the annual dinner will be an event of Friday evening while many of those attending will probably want to see the football teams of Notre Dame and Illinois in their annual clash on Saturday afternoon at Memorial Stadium. Because of the football crowds, those who plan to attend are urged to get early hotel reservations.

Midwest Agstone Producers Gather at Illinois State Fair Exhibit

In the midst of its exhibits at the Illinois State Fair at Springfield, August 14-22, twenty-four members of the Midwest Agricultural Limestone Institute and guests met in that city for their first annual reunion. The institute, of which Dan Sanborn of the Lehigh Stone Co., Kankakee, Ill., is secretary, counts among its members the leading producers of agricultural limestone in the middle west. Fifteen members of the association coöperated in the exhibit at the fair. These were:

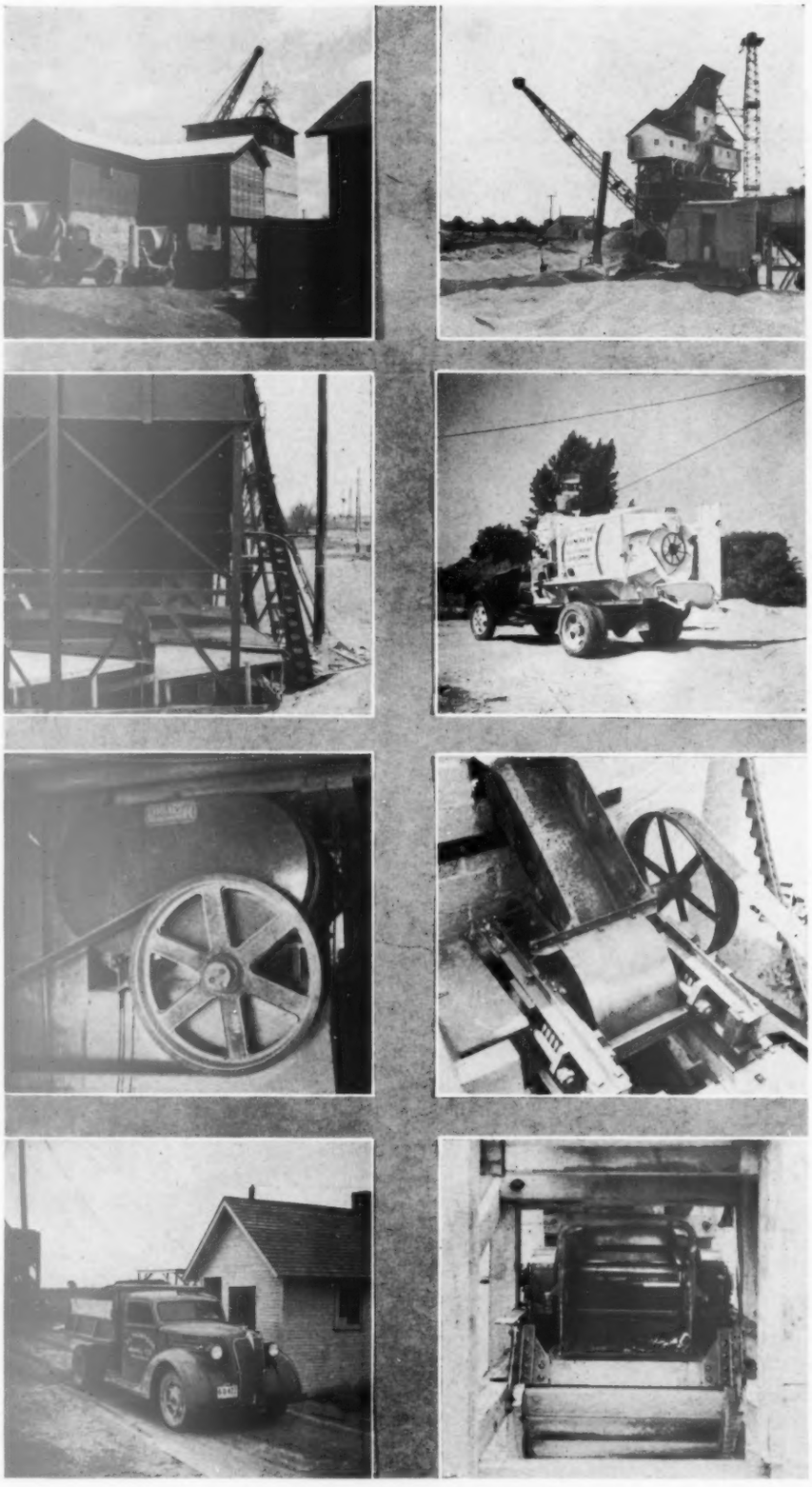
Anna Stone Co., Anna, Ill.
Columbia Quarry Co., St. Louis, Mo.
Consumers Co., Chicago, Ill.
Dolese & Shepard Co., Chicago, Ill.
East St. Louis Stone Co., East St. Louis, Ill.
Elmhurst-Chicago Stone Co., Elmhurst, Ill.
Lehigh Stone Co., Kanakee, Ill.
Lincoln Crushed Stone Co., Joliet, Ill.
Midwest Rock Products Corp., Indianapolis, Ind.
Mississippi Lime Co., Alton, Ill.
Moulding-Brownell Corp., Chicago, Ill.
National Stone Co., Joliet, Ill.
Newton County Stone Co., Kentland, Ind.
Ohio & Indiana Stone Co., Indianapolis, Ind.
Pontiac Stone Co., Pontiac, Ill.

Also coöperating at the exhibit were the Peoria Steel & Wire Co., manufacturer of the Paramount limestone spreader, and the Urbana Laboratories, Urbana, Ill., manufacturers of the Rich-or-Poor soil-testing equipment.

Charles R. Hutcheson, editor of *Modern Agriculture*, Waterloo, Ia., and widely known as "Alfalfa Hutch", addressed the fair visitors on the value of alfalfa. On Thursday evening, August 19, the members and their guests sat down to a banquet at Fischer's Inn near Springfield. The following members and guests were present:

Bald (F. A.), Dewey Portland Cement Co., Kansas City, Mo.
Bent (J. R.), Dolese & Shepard Co., Chicago, Ill.
Bills (E. H.), Moulding-Brownell Corp., Chicago, Ill.
Boyd (J. R.), administrative director, National Crushed Stone Assn., Washington, D. C.
Clark (Harry), Consumers Co., Chicago, Ill.
Duncan (. ..), Midwest Rock Products Corp., Indianapolis, Ind.
Fay (J. L.), Moulding-Brownell Corp., Chicago, Ill.
Goldbeck (A. T.), engineering director, National Crushed Stone Assn., Washington, D. C.
Hollingsworth (M.), Ohio & Indiana Stone Co., Indianapolis, Ind.
Hummel (. ..), National Stone Co., Joliet, Ill.
Hutcheson (Chas. R.), editor, *Modern Agriculture*, Waterloo, Ia.
Johnson (. ..), Urbana Laboratories, Urbana, Ill.
Kasteen (Sr.), Peoria Steel & Wire Co., Peoria, Ill.
Kasteen (Jr.), Peoria Steel & Wire Co., Peoria, Ill.
Kelb (N. E.), Ohio & Indiana Stone Co., Indianapolis, Ind.
Krause (E. J.), president, Columbia Quarry Co., St. Louis, Mo.
La Barge (. ..), Columbia Quarry Co., St. Louis, Mo.
Lambert (Max), Robins Conveying Belt Co., Chicago, Ill.
Marsh (Harry), Lehigh Stone Co., Kankakee, Ill.
McGinnis (A. P.), Wabash Railroad, St. Louis, Mo.
Merritt (Worth), Consumers Co., Chicago, Ill.
Phillips (S. A.), vice-president & directing editor, PIT AND QUARRY, Chicago, Ill.
Pickett (D. S.), Ohio & Indiana Stone Co., Indianapolis, Ind.
Sanborn (C. A.), Lehigh Stone Co., Kankakee, Ill.
Sanborn (Dan), Lehigh Stone Co., Kankakee, Ill.
Schmitt (H. F.), secretary-treasurer, Columbia Quarry Co., St. Louis, Mo.
Spencer (J. R.), director, Soil Improvement Dept. Illinois Agricultural Assn., Chicago, Ill.
Squire (R. H.), Columbia Quarry So., St. Louis, Mo.
Steuffel (William), Dolese & Shepard, Chicago, Ill.
Traver (Weir), Elmburst-Chicago Stone Co., Elmhurst, Ill.
Van Cleve (. ..), Ohio & Indiana Stone Co., Indianapolis, Ind.
Voskuill (W. H.), economist, Illinois State Geological Survey, Urbana, Ill.
Whiting (Dr.), Urbana Laboratories, Urbana, Ill.

New Equipment in Ohio Plants



LEFT (Reading down)—Concrete Transport mixer trucks at new concrete plant, National Lime & Stone Co., Lima, O.; Deister concentrator tables at plant of Home Sand & Coal Co., Fremont, O.; Pioneer roll crusher for producing agricultural stone, Schumacher Stone Co., Pandora, O.; New 2½-ton Diamond T truck of D. L. Thompson Gravel Co., Paulding, O. RIGHT (Reading down)—New ½-cu. yd. Northwest crane at plant of Moorman Sand & Gravel Co., Middletown, O.; Jaeger mixer truck which serves concrete plant of Bellefontaine (O.) Development Co.; Greenville roll-crusher and Pioneer vibrating screen at Independent Sand & Gravel Co. plant, Newtown, O.

16 c. of Every Road Dollar Is Diverted

Nearly 16 c. out of every dollar of state taxes paid by highway users in 1936 was assigned to non-highway use according to statistics collected from state authorities by the Bureau of Public Roads of the U. S. Department of Agriculture. Collections from state gasoline taxes, motor-vehicle registration fees and motor-carrier taxes amounted to over a billion dollars. Allocations to non-highway purposes amounted to $169,344,000, an increase of $22,202,000 over the previous year.

Other allocations were $583,616,000 for state highway purposes; $265,496,000 for local roads and streets; $37,942,000 for collection and administration; $1,597,000 for other highway purposes such as park and forest roads, etc.; and $8,346,000 was undistributed.

State taxes on highway users included registration fees and licenses amounted to $359,784,000, gasoline taxes of $691,420,000, and special taxes on motor carriers of $15,137,000. These taxes have been justified on the grounds that they are for the building and maintenance of good roads over which the vehicles must travel. Any other use of these funds, says the Bureau of Public Roads, detracts materially from the upkeep of the highways for which the motoring public is paying. In 1936, almost one third as much was used for non-highway purposes as was used for the building and maintenance of state highways.

Of the state taxes on highway users employed for other than highway purposes, about $89,000,000 went to the general state, county and municipal funds; $36,500,000 was paid for relief of unemployment; $33,000,000 was given to education; and approximately $11,000,000 for miscellaneous purposes, such as airports, navigation, service of non-highway debts, irrigation, parks, and other purposes.

Erie Producer Builds Small, Efficient Plant

A new plant of smaller capacity but designed for extremely low operating cost is being constructed by the Nickel Plate Sand & Gravel Co., Erie, Pa.

The maximum output of the new operation will be about 400 cu. yd. per day.

National Crushed Stone Assn.
National Lime Assn.
National Slag Assn.
Portland Cement Assn.

WITH THE TRADE ASSOCIATIONS

National Sand & Gravel Assn.
National Industrial Sand Assn.
National Ready Mixed Concrete Assn.

September, 1937

Joint Exposition Highly Regarded

Resolutions were adopted by the manufacturers at the last two aggregates conventions recommending the "joint exposition plan" whereby the National Crushed Stone Assn. and National Sand & Gravel Assn. would hold their annual conventions at a time and place requiring manufacturers showing at both conventions to make but one booth set-up.

As already announced, the crushed stone group will meet during the week of Jan. 24, 1938 at Cincinnati, O., followed by the sand-and-gravel organization in the week of Jan. 31.

To manufacturers who will participate in both expositions the advantage in reduced cost of exhibiting is evident. There is another advantage as well, resulting from having an increased attendance of producers who will be attracted by the larger and better show, giving the manufacturers a lower cost per prospect contact. The show will be larger because several equipment makers have been waiting for a move of this sort to justify their coming into the exhibit and still another group will be attracted by the prospect of the bigger producer attendance.

Cincinnati was again chosen for the gatherings because, in order to insure the best attendance of operators, it is necessary to meet within the area bounded roughly by Cleveland, Pittsburgh, Cincinnati, St. Louis and Chicago. Of the several possibilities and with consideration also for the Road Show in Cleveland the week of January 17, Cincinnati and the Netherland Plaza Hotel turned out to be the most suitable.

To Develop Standards for Revolving-Paddle Mixers

At the last annual meeting of the National Ready Mixed Concrete Assn. held in Memphis, Tenn., the "Proposed Tentative Standards and Recommended Practices for Truck Mixers and Agitators of Revolving Drum Type" were presented. These were approved by the executive committe in May of this year.

The specification, however, failed to cover a type of equipment being used by a number of ready-mixed-concrete producers, the *revolving-paddle* type.

At its meeting held in Buffalo, N. Y., on June 23, the executive committee authorized the appointment of a committee to study the desirability of developing standards and recommended practices covering types of truck mixers other than the revolving drum-type and the following have been invited to serve on it:

Stanton Walker, National Ready Mixed Concrete Assn. (Chairman)

T. H. Fleming, Concrete Transport Mixer Co., St. Louis, Mo.

Herbert Jahncke, Jahncke Service, Inc., New Orleans, La.

R. F. Powell, Fred Schmitt Material Co., St. Louis, Mo.

D. B. Thornton, Cromer & Thornton, Inc., Atlanta, Ga.

R. B. Young, Ready Mix Concrete, Ltd., Montreal, Canada.

It is expected that the work of this committee will be organized promptly and that recommendations can be made to the already existing Committee on Standards in ample time for consideration before the next annual meeting to be held in Cincinnati the week of Jan. 31, 1938.

Winners Are Announced in Gravel-Safety Competition

Thirty-five sand-and-gravel plants completed the eighth annual safety competition conducted during the calendar year 1936 by the United States Bureau of Mines in coöperation with the National Sand & Gravel Assn. These plants reported a volume of nearly 2,000,000 man-hours of work performed for the year, during the course of which the employees of the plants sustained 77 lost-time accidents, causing 24,584 days of disability.

The Oxford-Fuller plant, Oxford, Mich., was awarded the trophy in the group of plants working 100,000 man-hours or more. This is a dry-bank-deposit plant, operated by the American Aggregates Corp. The plant operated 118,328 man-hours in 1936 with 8 lost-time accidents causing 54 days of disability. The accident-severity rate was 0.456.

The Orange No. 14 plant, Orange, Cal., won the trophy in the group of plants working less than 100,000 man-hours. This is a dry-pit-deposit plant, operated by the Consolidated Rock Products Co. The plant operated 41,280 man-hours in 1936 without a lost-time accident.

During the year 1,938,059 man-hours were worked—an increase of 5 per cent. over the previous year—but there was a decline of 27 per cent. in the number of plants in the 1936 contest, indicating that many of the small plants closed down. Although the frequency rate was better than the average frequency rate for the entire eight years the contest has been in progress, it was not as good as the frequency rates for the three previous years. The severity rate was the poorest in the history of the contest. This is accounted for by 3 fatal injuries, which, according to the scale for weighing deaths and permanent injuries, carry 18,000 days lost, and four permanent partial injuries, which carry 5,320 days lost—making a total of 23,320 days for 7 injuries.

Lime Association Issues Selling Helps to Members

The National Lime Assn. within the past few weeks has sent out a number of "helps" to its members for use in increasing lime sales. Included in the sales aids are a set of liming material exhibits packed in a shipping carton, and two new folders featuring lime in construction which are supplied on order with the maker's imprint. The folders are "The Fifth Ingredient", featuring the use of hydrated lime in concrete, and "Dry Walls", promoting the use of lime in masonry mortar.

. . . Editorial . . . . . .

The Fruits of Competition

NO ONE who has seen much of life is likely to believe strongly in the possibility of arranging a world free from the struggle for existence. For it is not alone in the relations between human beings that we observe active rivalry; competition between the members of each life group as well as between the different groups and between them and the other conditioning factors of their environment seems to be as universal and as inevitable as life itself. Indeed, human life without struggle is quite unthinkable, at least as long as economic conditions as we find them impose necessities and obligations that only competition appears to be able to relieve.

Despite their recognition of this rivalry as a seemingly inescapable burden, men have sought to soften its rigors, to set limits to its operations, to set ethical standards for the conduct that it requires. Different peoples and different times have given rise to different standards as to what kind of existence is tolerable and as to the equity of the resulting distribution of the rewards of the struggle, although sometimes these standards acquire through relatively long acceptance a fixity that almost precludes the possibility of change and gives to them an almost religious sanctity. They have tried, through the development of social institutions and by the imposition of legal and other forms of group restraint, to devise means for a more comfortable existence and a more equitable division of the fruits of competitive enterprise, but they have not yet succeeded in creating an economic organization that will prevent the conversion of one man's extremity into another man's opportunity, or the rewarding of some at the expense of others.

No period of recorded history has been without some man-devised social restrictions on the ways in which men may win their livelihood. The extent to which man's predatory desires have been curbed seems to be determined most often by the abundance of "the good things of life", which includes the comforts quite as much as the necessities. The availability of the materials required for sustenance, housing and apparel in relation to the number of persons who seek them is often an index to the kind of social control in effect. Where these materials are scarce, where the ratio of population to resources is high, this control is almost certain to be rigid and far-reaching; where they are plentiful, where the ratio of population to resources is low, the regulations are likely to be few and weakly enforced. Competition is never suppressed, but only controlled, because economic conditions can not be removed, but only altered.

The trade practices of the European guilds were the result of a long growth, a long experience with competition in an economy of scarcity. Under the tremendous expansion in the amount of available resources, made possible by the discovery of this continent and the development of machine production, many of these well-established rules of business conduct fell into disuse, as the scarcity that had made their enactment necessary disappeared. Widely accepted codes concerning honorable dealing, quality of product, fairness to one's competitors, the wages paid to labor, what was called a "just" price, disappeared through lack of use, and in their place arose what economists of the period welcomed as "free competition", the kind of unrestricted rivalry that was believed to be fairest when it was freest. Where opportunity was so widely available and the resources necessary for fairly comfortable living so abundant, there was little disposition to quarrel with the new standards, or, more correctly, the absence of standards.

ABUSES lead to remedies, and the liberty of action, the freedom from restraint, which the new era of "free competition" made possible, laid its penalties heavily on the shoulders of business men themselves. They might safely be unmindful of the interest of the consumer or the worker, but when they encroached on the "rights" of their competitors, as they were certain sooner or later to do, it was inevitable that the doctrine of unfair competition, particularly in its narrower meaning of diverting a business man's patronage through deceit, would be invoked to restore to business some semblance of regulation. It was not until later, however, that legislation made its power felt in the field of competition, after it was discovered that the conditions surrounding business dealings had in many cases passed beyond the reach the courts, hampered as they were by the

necessity for dealing with a new situation by the application of old laws or customs.

The excesses which had aroused public sentiment to a point that made new legal restrictions appear necessary resulted finally in the passage of the federal laws of 1914, which attempted to bar practices that were injurious to competitors and often, by indirection, harmful to consumers. Price discrimination, recently made illegal by the passage of the Robinson-Patman act, had been prohibited by the Clayton act, but the old legislation had been ineffective in curbing a practice which was damaging some competitors quite as much as it was favoring some buyers. "Unfair methods of competition", as used in the Federal Trade Commission Act, was still a term applicable, if not exclusively at least principally, to unfairness with respect to a competitor rather than to unfairness with respect to a consumer, although it was obvious to many that both types of unfairness were the result of "free competition". It was found to be quite as common for what was termed an unfair trade practice to be aimed at the competitor through the consumer as at the consumer through the competitor. Advertising which claimed for an inferior product the rank of "best" deceived the consumer into forming an erroneous appraisal of the product, while it at the same time diverted business from the manufacturer whose product was actually the best. Selling methods which sought to make the consumer apprehensive of competitive products, which may have been and often were of better quality, injured both the buyer and the competitor. The development of selling and advertising technique made it increasingly difficult to distinguish between injury to a competitor and injury to a consumer, since it was hard for any manufacturer or merchant to accomplish the one without at the same time accomplishing the other.

IN RECENT years public sentiment has become more deeply interested in the consumer effect of unfair competition than in its competitive effects. The feeling that competitors can be depended upon to guard their own interests has lessened the public's concern with the problems of exclusive dealer arrangements, freight rebates, and the like that agitated the nation a generation ago, and has focussed it on problems of greater immediacy — price discrimination, basing-point pricing, misrepresentations as to quality and similarly deceptive selling and advertising methods, adulteration, substitution, the secret use of noxious substances in foods, drugs and cosmetics, short-measuring, etc. The relatively "free" competition in which these practices were born seems destined to give way to some form of controlled competition, under which it is hoped that many of these undesirable methods can be eradicated. Certainly this is the aim of much of the remedial legislation that was presented to the last Congress and is being held over for consideration by its successor. The passage of numerous laws designed to introduce a greater element of fairness into the relations between competitors and their customers as well as between competitors themselves will be almost a safely predictable accomplishment of the next session.

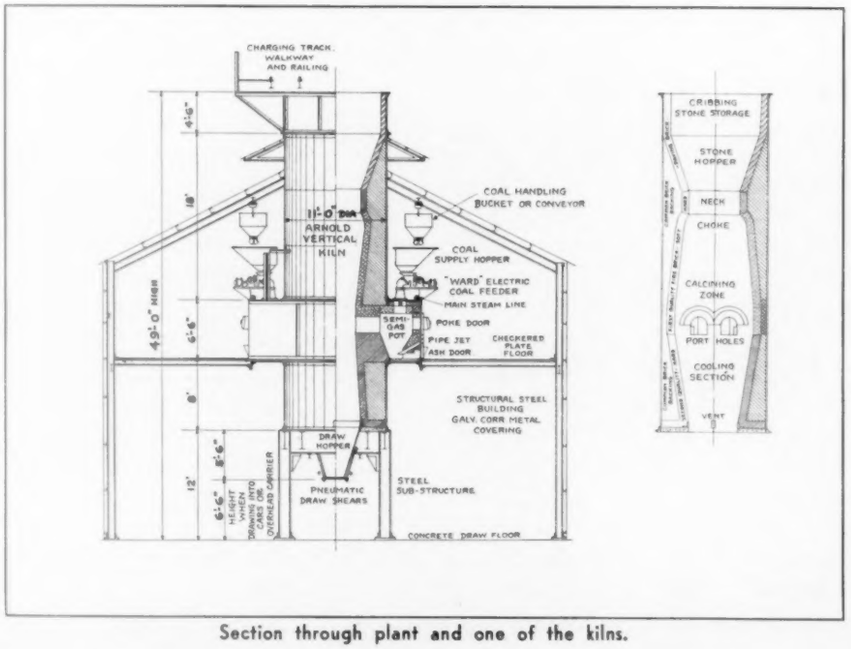
THE LONGER legislative action is delayed the more drastic are the enacted laws likely to be. The failure of the last Congress to take action has only added to the determination of some groups — big business men, small business men, merchants and consumers — who have initiated or supported the measures that were proposed, for it has appeared to be the result of the pressure applied by those interested in opposing the reforms and not that of careful deliberation. Consumer groups believe that certain sections of business are not likely to favor governmental regulation of trade practices as long as influential organizations can say, for example, as the United States Chamber of Commerce recently stated, that "any attempt by governmental authority to impose a censorship upon advertising would be an intolerable intrusion into private business".

The fruits of competition are many, and the freer or less restrained the competition, the more numerous they are certain to be, and — a reading of economic history almost leads one to say — the more dangerous they are likely to be. The belief in the virtues of unbridled competition was the natural result of a belief in the near-infallibility of individualism, the theory that led Bentham to say that "the study of [a man's] own advantage naturally or rather necessarily leads him to prefer that employment which is most advantageous to society". Carried to its logical conclusion it leads almost to philosophical anarchism which would place the individual above society. It is, indeed, in this stage of the development of one's egotism that one is most certain to collide with the interests and ambitions of other individuals, and it is at this point that some of the practices born of "free competition" — that is to say, unhampered competition — pass from the category of socially useful to that of socially dangerous, from the field of fairness to that of unfairness. The borders of these fields have changed materially in recent years and public sentiment seems to be demanding a redefinition of the two. In the interests of well-meaning business men and the consumers group as a whole the next Congress can hardly escape the enactment of some kind of competition-controlling legislation.

GIBSONBURG

Gibsonburg operations from the quarry. New crushing plant and temporary Diesel-engine building in foreground.

The plant with new kiln-building addition at right.



Section through plant and one of the kilns.

THE Gibsonburg Lime Products Co., Gibsonburg, O., in 1927 built a new vertical-kiln plant which was remarkable even in this important lime-producing district for its efficiency and economy of operation. During the following years occasional improvements were made to this plant and these have resulted in even better performance and have made possible the addition of many products to the company's line. An extensive program of improvement and enlargement just completed again makes this one of the outstanding operations in the Ohio finishing-lime district.

When placed in operation late in 1927, this plant had eight vertical kilns with a combined capacity of 100 tons of lime daily. A single hydrator was used and masons', agricultural, and finishing limes were produced. Subsequent improvements have materially increased the capacity of the plant in all departments. Now a wide variety of products are made, including hydrated finishing limes, masons' hydrate, fibered lime plaster, agricultural hydrate, spraying and dusting hydrate, hydrated household lime, magnesian hydrate, and magnesian quicklime for building, chemical and fluxing uses in the following grades of fineness: lump, crushed, granular and pulverized.

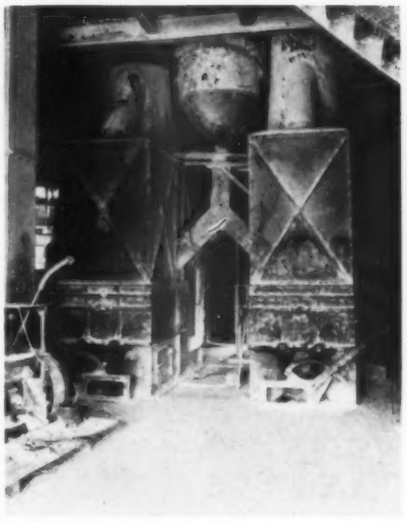
The plant was designed by Arnold & Weigel, Inc., contractors and engineers, Woodville, O., in coöperation with the lime company, and the improvements were made in the same manner.

The first important improvement was made in 1934, when a Bonnot mill was installed for grinding hydrate. Another Bonnot mill is on hand and will soon be installed. In 1935 a Williams hammer-mill and a Tyler Hum-mer screen were added for the production of raw fluxing lime. In 1936 a Broughton mixer, bins and a Valve Bag packer were installed for the production of special lime plaster, as well as a bag-storage building, a second Weber hydrator of Arnold & Weigel make, and two 4-tube packers for finishing hydrate. The latest improvements include five additional kilns, a crushing-and-screening plant in the quarry, and a Diesel engine to operate the quarry equipment.

The plant operating methods were described in PIT AND QUARRY shortly after operations were begun. At that

LIME PLANT ADDS FIVE VERTICAL KILNS

Enlargement Gives Operation 13 Kilns; New Crushing Plant Also Built to Use Power Supplied by Single Diesel Engine



Two hydrators, one of which was installed last year.

time the rock was picked and loaded by hand into 2-cu. yd. Koppel side-dump cars, which were hauled by horses to the foot of the incline leading to the plant. In recent years the quarry had been operated two 8-hr. shifts daily. On each shift were twelve 2-man loading gangs, three drillers and shooters and one or two horse drivers. All the cars were loaded on a piece-work basis and were weighed on a Howe track scale, equipped with a Weightograph. This scale actually increased the tonnage moving up the incline by approximately 60 per cent. It is considered a worth-while investment for anyone operating on the piece-work basis.

Automatic coal feeder at one side of a kiln.

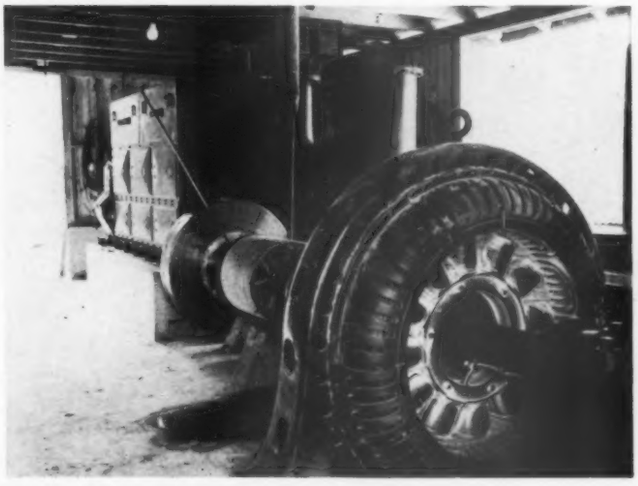
Since the new crushing plant was installed the same output, about 600 tons daily, has been loaded in from 6 to 8 hr. by a 1½-cu. yd. Marion electric shovel. The operations in the quarry now require six drillers, four truck drivers, a crusher operator, a screen man, an engine man, a shovel operator and two men to load cars for the plant.

Four trucks now haul the shovel-loaded stone to the crushing plant, where it is discharged into a 24-in. by 48-in. McLanahan & Stone single slugger-roll crusher. The minus 8-in. product of this crusher is carried by a Jeffrey 63-ft. inclined chain-bucket elevator to a hopper, which feeds the stone on a 4-ft. by 12-ft. Tyler double-deck Ty-Rock rubber-mounted screen that operates with almost no vibration to the supporting structure. This screen is equipped with 4½-in. openings on the top deck and 3-in. and ¾-in. openings on the bottom deck.

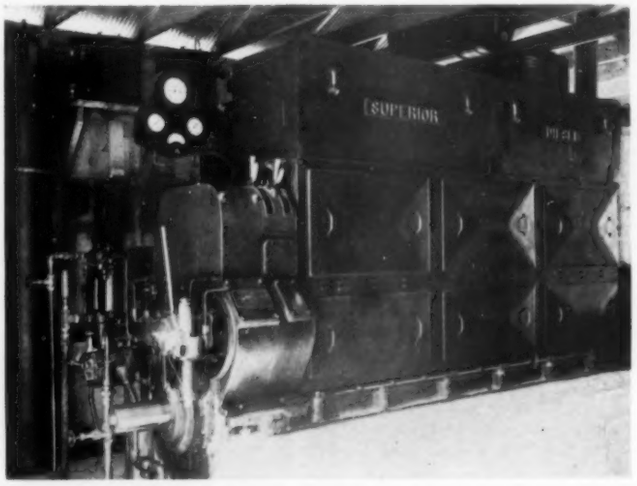
The 4½-in. plus rock is kiln rock and is discharged on a short horizontal picking belt. The stone suitable for lime is discharged into one bin compartment and the rejects into another. The minus ½-in. stone goes to a third compartment for agricultural or road stone. Another screen is to be installed to separate these materials, but at present this is being done at another location. The 4½-in. to ¾-in. rock is discharged into a fourth bin compartment.

Some of the quarry cars are now loaded from the bins and haul the large stone to the kilns. These cars can also be loaded with the 4½-in. to ¾-in. stone, which is then discharged into an Allis-Chalmers No. 5 gyratory crusher at ground-level for further reduction. This stone is then fed on a belt-conveyor to a rotary-kiln roasted-dolomite plant, which is on the property but is operated by another company.

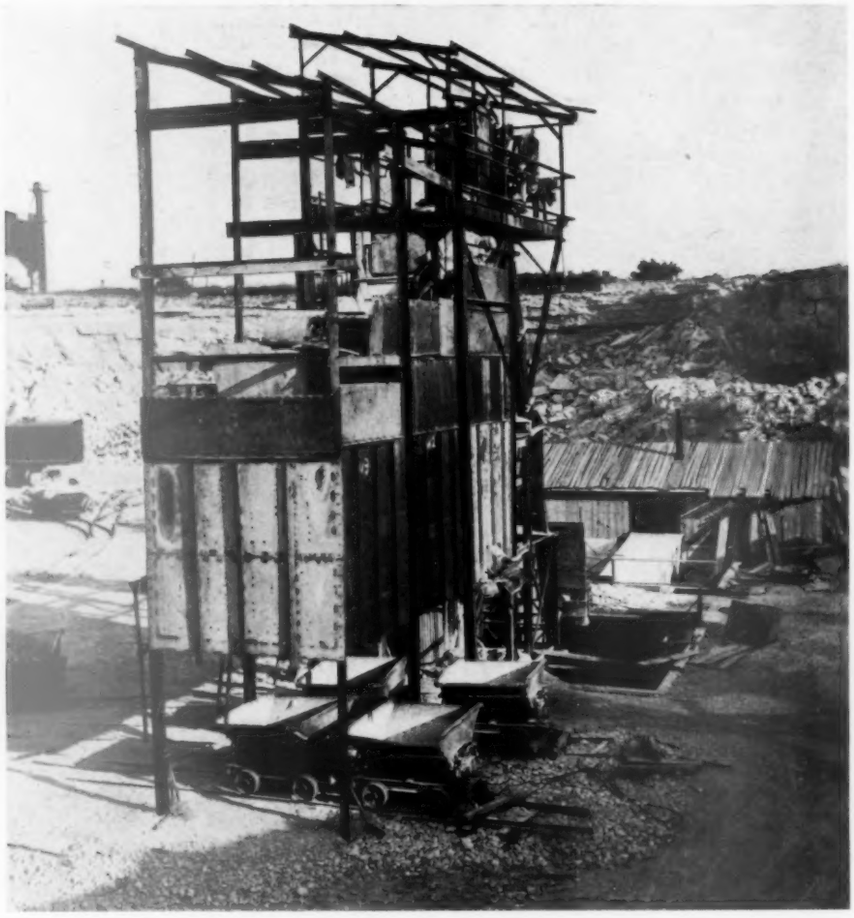
All the quarry equipment is operated from a 6-cylinder National Superior Diesel engine installed at the same time as the crushing plant. This engine is rated at 260 hp. at 600 r.p.m. A single drive-shaft is connected to the



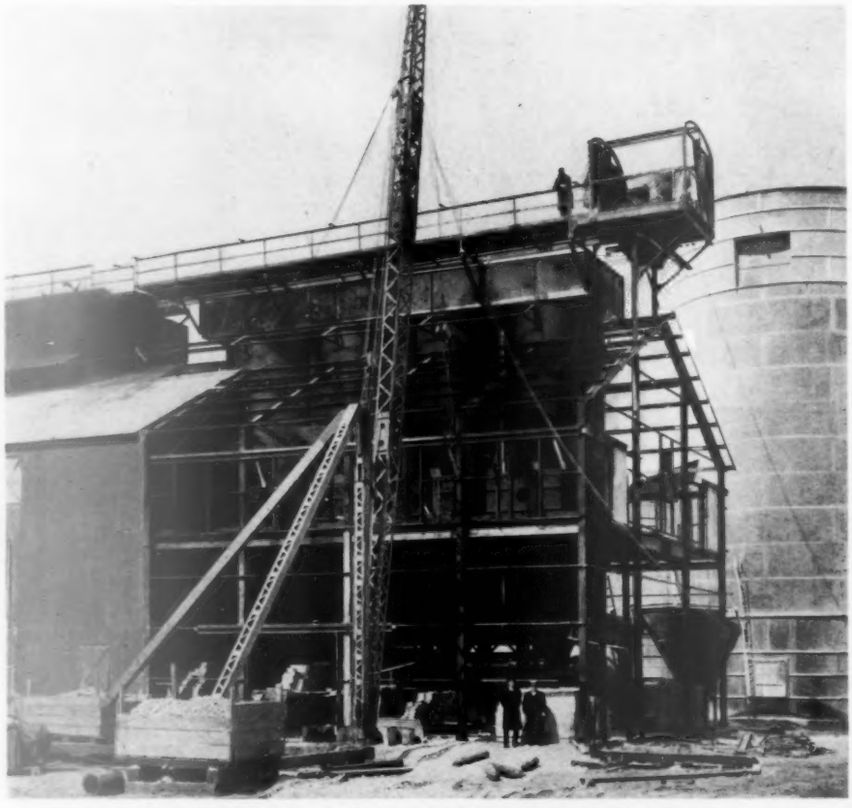
The 6-cyl. 260-hp. Diesel engine and generator.



Another view of the engine which operates all quarry equipment.



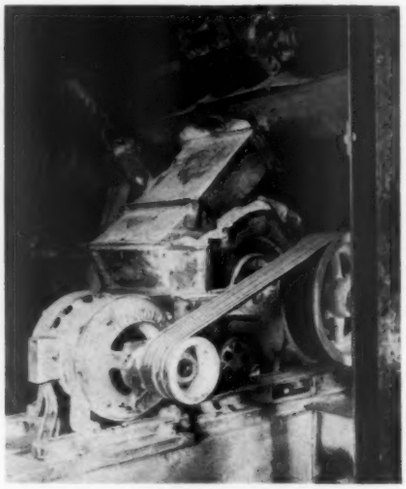
The new crushing plant. Cars are hauled up incline to kilns.



Construction view showing kilns before being inclosed.

engine by a clutch and on it is a pulley from which the primary crusher is driven by a flat belt, the alternator furnishing power for the other quarry equipment, and another pulley from which the 12.5-kw. exciter is driven. The Allis-Chalmers 196-kw. alternator generates 440-v., 60-cycle current.

In daytime operation the engine is fully loaded. Following are the various units driven by the engine with the approximate power consumed by each: primary crusher (70 hp.), elevator (25 hp.), screen (7½ hp.), pumps (3 hp., 15 hp. and 20 hp.), shovel (50 hp.), air compressor (50 hp.), secondary crusher (25 hp.), hoist (50 hp.). All the milling and hydrating is now done at night with power from this engine. With this arrangement the only current purchased is that used in



Hammer-mill used in producing raw fluxing lime.

the plant during the day to operate the kiln stokers and the equipment for crushing and storing the quicklime. According to S. G. Price, vice-president of the company, no figures on savings due to this engine are yet available but substantial economies are resulting. The fuel oil burned by this engine, when driving only the primary crusher, according to Mr. Price, costs no more than the former replacement cost of pick, shovel and fork handles when hand loading.

The engine is equipped with an Alnor selective exhaust pyrometeh and U. S. Gauge Co. pressure gages for lubricating oil, fuel oil and starting air. Air for starting is supplied by a Curtis air-compressor, and 250-lb. pressure is usually maintained, although only 150 lb. is needed to start the engine. The engine is also equipped with a Coppus air filter, and oil pump, a Purolator and water and oil cooler, and a built-in water pump. An automatic alarm system rings a bell, if the

Compressor which supplies air to start the new Diesel engine.

oil pressure drops too low or if the cooling water gets too hot. The control board for the alternator and exciter has mounted on it General Electric a.-c. and d.-c. volt-meters and ammeters. A Deming deep-well pump drains the primary-crusher pit and supplies water for cooling the engine.

The eight original kilns are standard Arnold & Weigel kilns, 11 ft. in diameter and 24½ ft. high, with Arnold patented shaped linings. The four new kilns are identical with the old ones except that they are fully insulated with Harbison-Walker H-W 77 porous insulating brick. A West Virginia nut coal of 13,500-b.t.u. and low ash content is being use. The value of this insulation is evident from the fact that the new kilns are showing a fuel ratio of 4.8 to 5.0 to 1 compared to 4.5 to 4.8 to 1 in the older kilns.

The company has been experimenting with various types of fire bricks in the kilns. Several kilns are lined with Harbison-Walker "Franklin Crown" bricks and others with de-aired bricks made by the same company. Some Taylor de-aired bricks are also used. These de-aired bricks are harder than those customarily used in vertical lime kilns but have not yet been installed long enough so that definite comparisons can be made.

One side of the firing floor. Note neatness of installation. Automatic coal feeders above.

Drawing lime into car beneath kiln by means of air-operated shear gates.

Coal is supplied to the kilns by means of a Louden Machinery Co. 1-ton bucket running on an overhead rail. This discharges the coal into the feed hoppers of the Arnold & Weigel Ward automatic stokers. These stokers automatically feed the coal at short intervals into the external fireboxes of the kilns, spreading the coal evenly across the bed of fire. Proper proportions of steam and air in the firebox produce a long flame. The furnace has no grates and the fires are cleaned every 24 hours.

The first of the four new kilns was fired on April 26, 1937 and the last on May 15, as the additional capacity needed to meet demands made it necessary to put each kiln in operation as soon as it was ready. The shell of a fifth new kiln was also installed and is now being lined with fire brick.

Mill installed in 1934 for grinding hydrate. Another mill is on hand and will shortly be installed.

The steel for the kiln shells and the kiln-building extension was supplied by the Pittsburgh-Des Moines Steel Co. and was erected by a sub-contractor. All the concrete was poured by the company's forces. Arnold & Weigel, Inc. did all the engineering and designing, supplied all the plans and specifications and supervised the installation. This firm also supplied the ten new Ward electric coal feeders and the special kiln castings required with this system of firing.

Draws are made every 4 hr. through pneumatically-operated shear gates of Arnold & Weigel design. The lime leaves the coolers at a temperature of from 120 to 150 deg. F. A Louden hopper-bottom steel car running on a double-track overhead rail under the entire row of kilns discharges the lime on a pan-conveyor, where any necessary hand picking is done. The good lime is discharged into a Sturtevant No. 2 gyratory crusher which reduces it to a suitable size for hydration. The lime is then elevated to storage bins from which screw-conveyors feed it to the two Arnold & Weigel Weber hy-

(Continued on page 55)

Single slugger-roll crusher in the quarry; elevator at left.

By ARNOLD KRUCKMAN

News and Views from the Capital

IN whatever form it may finally be dramatized it is certain that the President purposes to carry the fight for the wage-hours bill, and for the original court-reorganization bill, to the public. The main drive will be made among the working people and the farmers. The President is unshakeably convinced that he is as strong among the lower brackets, the "submerged third", the wage-earners and the soil-tillers, as he has ever been.

It is certain at this writing—as certain as anything may be in this Administration—that the whole court fight will blaze up with greater fury. To this will be added the issues of the wage-hours debate, the farm relief, and the governmental reorganization plan. The court plan is still the keystone of the whole New Deal structure.

The President is scheduled to make one of his speeches on the anniversary of the sesqui-centennial of the signing of the Constitution. The night before, Senator Borah, on a nation-wide hookup, will deliver the essential parts of the speech he did not give in the Congress during the court discussion. This speech is expected to force a showdown with the President on the subject of the court. And when he makes his swing around the continent he is to be followed, speech after speech, by members of the opposition to the court-reorganization plan. It has been many years since the political affairs of the nation have reached such tension that its leaders have taken their differences to the public.

All this is bound to happen before November because it seems certain at this writing that the President will call the Congress in special session during that month. As will appear in the thumbnail summary hereafter, the legislative program the Administration feels must be enacted in the next session is extensive; and to push it through will require more time than would be available on and after January next. It will be almost impossible to hold the Congress in Washington after late April or early next May, because every member of the House will be campaigning for reëlection, and one-third of the Senators will be making the fight to retain their jobs. The earliest of the primaries come during the first week of June. It will be clear why the special session is important, and why Speaker Bankhead warned the members of the House to be prepared to buy their return transportation some time in October.

Aside from the wage-hours bill, of which more later, the Senate passed the Wheeler-Lea bill, expanding the powers of the Federal Trade Commission extensively. But the House failed to pass those bills, nor did it pass the following, which went through the Senate: the Wheeler-Johnson anti-child labor bill; the McCarran 70-car train bill; condemnation of sit-down strikes and unfair labor practices; Copeland Food-and-Drug bill; prohibition of interstate transportation of strike-breakers; wheat-crop insurance, and the safety-at-sea bill.

On the other hand the following bills were passed by the House, but held up in the Senate: anti-lynching bill; bankruptcy revision bills; long-and-short haul repeal; provision of the six secretaries for the President; government-reorganization bill; regulation of natural gas; salary-publicity repeal; presidential postmaster civil-service classification.

The bills that were passed by both Houses include: farm tenancy act; Supreme Court retirement act; cash-and-carry neutrality act; unemployment-census act; municipal bankruptcy act; judicial-procedure act; new Guffey coal act; two-year extension of nuisance taxes; income-tax loophole-plugging act; "hot oil" control act; farm-loan interest reduction, passed despite presidential veto; extension of presidential trade-agreement and fiscal powers; new soil-conservation act; new railroad-retirement act; Tydings-Miller resale-price-maintenance act; sugar-quota act; and Wagner housing act.

Including the first, second and third deficiency bills, and reappropriations, permanent appropriations and miscellaneous appropriations, the first session of the 75th Congress appropriated a total of more than $9,400,000,000. This exceeds the last Congress by $1,290,000,000, not counting the soldiers' bonus. This expanding rate of taxation is a reminder that Senator La Follette is ready to launch in the next session the fight to lower exemptions, increase surtaxes, and expand the foundation for the income tax to include practically all the earners of wages. In addition, the Treasury has let it be known that it has almost finished its profound study of tax laws and will be ready to submit its resultant program to the Congress at the next session.

The wage-hours bill, often called the Black-Connery bill, is jammed in the House Rules Committee, and by reason of the stubborn and sincere resistance of the southern legislators, aided by others scattered all over the country, it is doubtful if it will come out of the next session unless the President is successful in bringing popular pressure to bear. The strong and very lively opposition developed almost spontaneously by the industrial and business community, plus the solid dislike in the South, and much similar feeling among farmers, and considerable suspicion among A. F. of L. captains, apparently has made the fate of the bill somewhat problematical. It is quite possible, if the business men of the nation, large and small, with their allies, will personally and individually place their opinions and ideas before their Congressional representatives while the representatives are back among the homefolks, that the effect will be advantageous to the interest of business and industry. A bill *will* unquestionably be passed during the next session. What kind of bill it will be depends largely upon the force and sincerity with which the individuals of industry and business help the legislators to formulate the bill.

The Administration is pushing the original plan outlined early this year in PIT AND QUARRY, based upon the 40-hr. and 40c. schedule; *and* the formula devised by Donald Richberg and Assistant Secretary of Commerce Ernest Draper, which includes a "restatement" of the anti-trust laws, and a division of the powers under such "restatement" by which the Federal Trade Commission would become a judicial body purely, and the Department of Commerce would be endowed with the police powers to secure the

(Continued on page 55)

The modern drying plant of the Southern Phosphate Corp. at Ridgewood, Fla. At the right is the trestle from which washed phosphate is discharged to stock-piles.

Washing Plant of Southern Phosphate Corp. Sets New Standard for Industry

By W. E. TRAUFFER

ALWAYS one of the most progressive of the producers of phosphate in this country, the Southern Phosphate Corp. has recently added to its prestige by the construction of a new and modern washing plant. This plant, known as San Gully Washer No. 2, went into operation in March, 1937. An average of 300 cu. yd. of matrix and 240,000 gal. of water are fed to this plant per hour. The capacity of the plant varies with the B.P.L. (bone-phosphate-of-lime) content of the deposit, but an average of about 2,000 tons of finished phosphate (dry basis) is produced in a 24-hr. day. This represents about 90 per cent. recovery of the actual amount of phosphate in the matrix, exclusive of that which is in the slime and is not recoverable.

The Southern Phosphate Corp. was organized in December, 1919 for the production of pebble phosphate in the Lakeland district of Central Florida. In August, 1930 the present modern drying plant (*P. & Q.*, Aug. 12, 1931, p. 20) was put in operation near the main office of the company at Ridgewood, 4½ mi. west of Bartow. San Gully Washer No. 1, located about 1¼ mi. north of the new washing plant, began to run out of material late in 1936, and it became necessary to build a new plant at a new location. The new San Gully No. 2 washer is located about 4 mi. southwest of Lakeland and 12 mi. northwest of the drying plant.

The company has another washing plant at Medulla, between Lakeland and Mulberry, known as the Standard Plant. This is operated only when extra capacity is needed and it also supplies the drying plant at Ridgewood. All the phosphate produced is dried before shipment to improve its grinding qualities and to eliminate freight charges on the water in the material.

In a paper entitled *Mining Practice in the Florida Pebble Phosphate Field,* presented at the New York meeting of the American Institute of Mining and Metallurgical Engineers in February, 1936, Chester A. Fulton, president of the Southern Phosphate Corp. gave a very clear and complete description of the methods typical of the pebble-phosphate field. Discussed in detail in this paper are the history and geology of these deposits, the methods of prospecting, overburden removal, hydraulic mining of the matrix, milling and drying, tailings disposal, and other phases entering into the production of pebble phosphate and their costs. This paper has been made available by the A. I. M. M. E. as Technical Publication No. 662. At this same meeting Charles N. Becker, assistant manager of the Southern Phosphate Corp. presented a paper entitled *Drying and Processing of Pebble Phosphate in the Florida Field,* in which he described in detail the general practices in the industry and the methods used in his company's drying plant at Ridgewood. This paper is Technical Publication No. 677. Abstracts of both these papers were published in the report of this meeting in the March, 1936 issue of PIT AND QUARRY.

The San Gully deposit has an average of 18 ft. of sand-and-clay overburden and 8 ft. of matrix. A pit ½ mi. long and 210 ft. wide is worked out to its full length before another pit is started alongside. Stripping is done by a Type 320-B Bucyrus-Erie electric crawler drag-line with a 138-ft. boom and a 9½-cu. yd. Page drag-line bucket. This machine piles the

A view of the new washing plant from the concentrator end. Office is in foreground.

Hydraulic recovery of the matrix. The 12-in. pump feeding the washing plant is in the foreground.

Crawler tractor hauling sections of pipe in the field.

overburden in long rows in the neighboring worked-out pit and moves an average of 700 cu. yd. per hr. It is powered by three electric motors with Ward-Leonard control and travels on four sets of double-crawler treads.

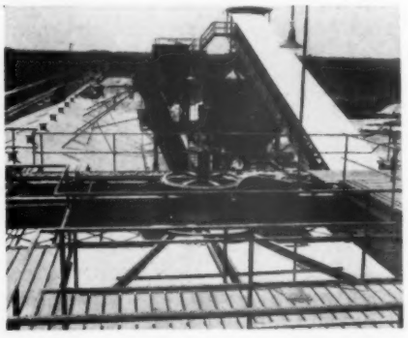
Mining is done with two Georgia Iron Works hydraulic guns or giants with 2¼-in. tips and 190-lb. nozzle pressure. Water is supplied to these nozzles through 8-in. pipe from a Y at the end of a 12-in. pipe-line extending to the edge of the pit, where it is connected to the main 16-in. water line from the plant. An Allis-Chalmers centrifugal pump supplies 4,000 gal. of water per min. for hydraulicking.

The matrix is washed down by hydraulicking into a sump from which the pulp is pumped by a 12-in. Georgia Iron Works centrifugal pump with 12-in. intake and discharge lines. Republic malleable pipe with cast-steel flanges is used in the pulp line and Goodyear suction hose at the intake and at the pump connections. This system handles an average of 300 cu. yd. of solids per hr. to the plant, a distance of about 2,000 ft. at present. About every 48 hr. it is necessary to move this pump and the guns forward toward the retreating face and this is done with the drag-line. It is estimated that the new washer will be operated in its present location for about ten years before relocation will be necessary.

At the plant the pulp line discharges into a steel receiving box from which the flow is split to two flumes with 3/64-in. perforated metal inserts which partially dewater the pulp. The pulp flowing over these screens is discharged into two 4-ft. by 12-ft. Georgia Iron Works revolving screens. These screens are equipped with 1½-in. perforated plate and have lifting flights which bring the mud balls out at the ends.

These mud balls drop on a 20-in. horizontal belt-conveyor which discharges them into the main waste flume to be described later. Sprays in these screens help to break down the clay and separate it from the phosphate pebbles.

The pulp passing through the revolving screens is discharged on 3/64-in. stationary screens for dewatering before going to two 5-ft. by 8½-ft. Robins Gyrex single-deck vibrating screens also equipped with 3/64-in. Tyler Ton-Cap wire cloth. Deister Concenco spray nozzles on these screens remove more of the clay from the pulp, which is then discharged into a Georgia Iron Works dual log-washer. This is essentially two double-shaft log-washers set side by side with the partition removed. The shafts are 8-in. pipes 21 ft. long with four rows of blades bolted to each. These log-washers are also supplied with additional water and serve to break down still further the foreign matter in the pulp, which is then discharged on two 5-ft. by 12-ft. Robins Gyrex single-deck screens fitted with 5-mesh cloth. Deister spray nozzles on these

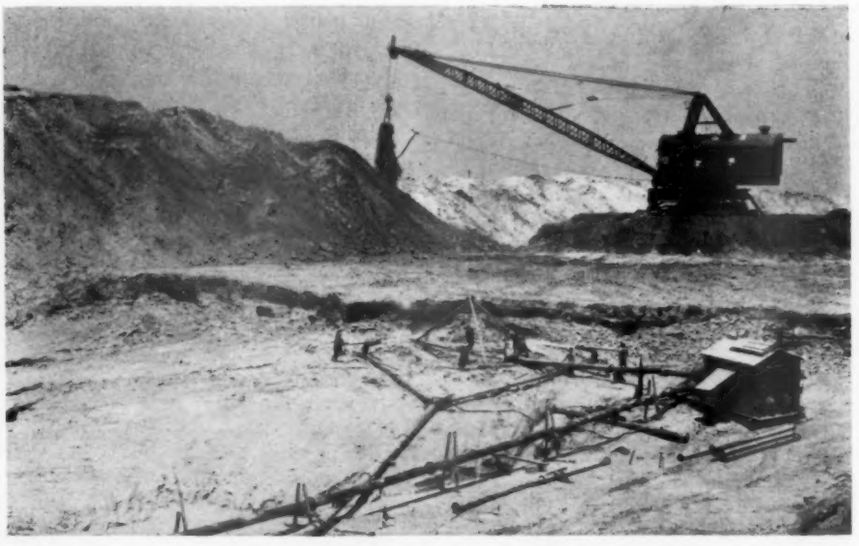


Looking over the concentrator building from the washer building. Bowl classifier in foreground.

Some of the centrifugal pumps which supply wash-water for the plant.

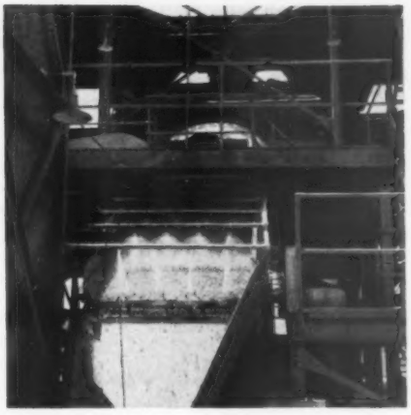
screens aid in the washing and separation. The oversize material from these screens is discharged into a 36-in. by 8-ft. Hardinge conical mill or scrubber which aids further in breaking down the clay and discharges on a single 5-ft. by 12-ft. Robins Gyrex single-deck screen with 5-mesh cloth and Concenco spray nozzles. The material retained on this screen is washed coarse pebble phosphate and is discharged into the boot of a 40-ft. belt-bucket elevator. The elevator discharges the phosphate on a 20-in. belt-conveyor which drops it into a 200-ton steel storage tank. Cars loaded from this bin carry this coarse product to the drying plant.

The undersize (minus 5-mesh) material passing through the two screens preceding and the screen following the conical mill flows with the wash-water into a sump from which an 8-in. Georgia Iron Works pump transfers it into a pair of Allen 10-ft. square settling tanks. The product of these tanks contains 70 per cent. solids and



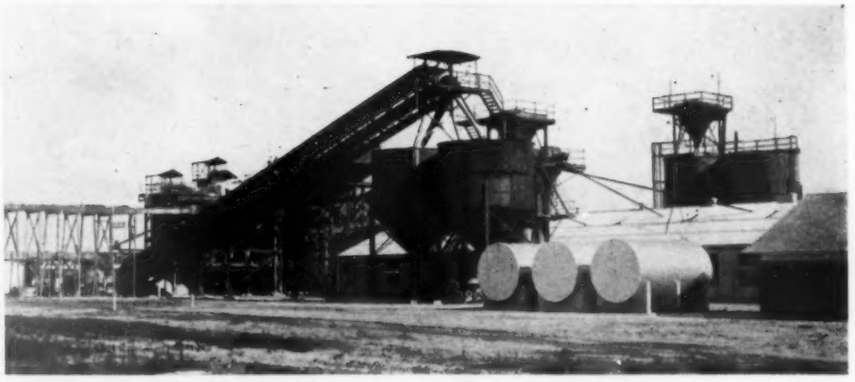
General view of pit operations. The drag-line first removes overburden from matrix which is then recovered by hydraulicking and pumping.

is discharged into two Dorr Fahrenwald 6-pocket sizers with steel tanks. Water for sizing is introduced at the bottom of each sizer at the rate of 1,000 gal. per min. at 10-lb. pressure. Four pockets of each sizer settle out the finished fine rock which is discharged into a 5-ft. by 25-ft. drag dewaterer of the company's own de-



The vibrating screen which retains coarse pebble phosphate. Conical scrubber is visible above.

sign with a steel-lined concrete tank. The product of the last two pockets of each sizer is discharged on a 4-ft. by 5-ft. Link-Belt single-deck vibrating screen fitted with 16-mesh lateral-slotted wire cloth. The material retained on this screen is discharged into the drag dewaterer just described. The dewatered product is discharged from the drag into a 40-ft. belt-bucket-elevator. A 24-in. belt-conveyor discharges this material into another 200-ton steel tank alongside the coarse-phosphate tank. This fine rock is also loaded into cars to be hauled to the drying plant.



A view of the new San Gully Washer No. 2 with washing department at left and concentrator building at right. The three reagent storage tanks are in foreground.

The undersize (minus 3/64-in.) from the stationary screens and the first pair of vibrating screens is discharged into a 40-ft. diameter Dorr Hydroseparator. The overflow from this machine is flumed to waste by gravity, carrying along with it the mud balls from the revolving screens previously described. The underflow is fed to three Dorr Fahrenwald 6-pocket sizers with wood frames which are otherwise like the other two sizers. The overflow from these three sizers, together with the overflow from the two fine-rock sizers, goes to a pipe direct-connected to a 12-in. Georgia Iron Works pump which rehandles it to the first of a series of waste ponds which allow the water to clear up for re-use.

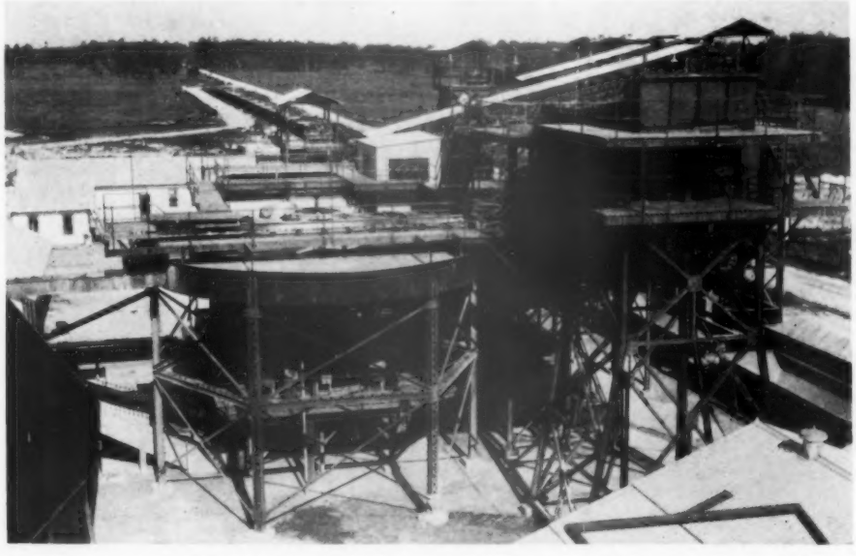
The first spigot or pocket of each of these three sizers takes out the coarsest of the material from the Hydroseparator and discharges it on the Link-Belt vibrating screen previously described. The last five spigots of these sizers discharge their product to the table-feed drag dewaterer which is the same in size and design as the fine-rock drag. The undersize (minus 16-mesh) material from the Link-Belt screen is also discharged into this table-feed drag. The overflow from both drags goes into the screen underflow sump and is pumped with this material into the two Allen settling tanks already described.

The product of the table-feed drag is discharged on a 24-in. inclined belt-

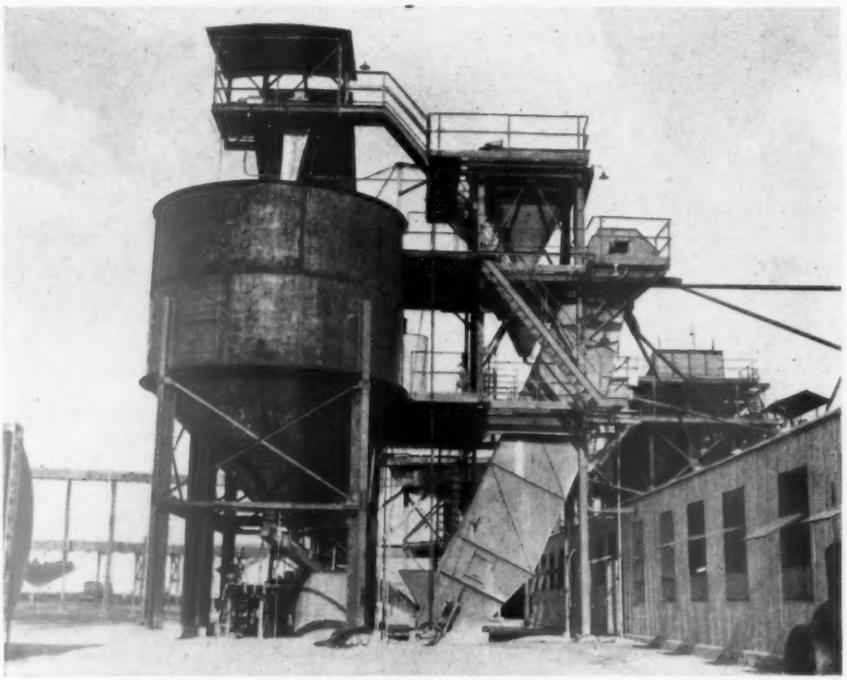
Some of the 35 concentrating tables which make final separation of wet phosphate.

conveyor which discharges it into two 300-ton steel tanks. This material is discharged from the tanks into a 7-ft. diameter Denver conditioner. This is a vertical paddle-type mixer in which flotation reagents are added. The mixture is discharged from the conditioner into two 36-ft. inclined belt-bucket elevators. The discharge of each elevator is split two ways to distribute the mixture to four Deister Concenco 8-way revolving feed distributors in the table plant. Each distributor feeds eight of the 32 Deister Concentrator Co. Deister-Overstrom No. 6 concentrating tables.

Each of these tables makes three products: concentrate off the side; middlings at the corner; and tailings (mostly silica sand) at the end op-



The washing plant with 40-ft. bowl classifier at left. Cars at right are being loaded for transfer of washed phosphate to drying plant.



Close view of equipment for feeding concentrating tables. Bins at left feed a conditioner where reagents are added. Elevator feeds tables.

posite the feed. The concentrate flows by gravity to a sump located near the center of the building. An 8-in. Wilfley pump transfers the concentrate into a 10-ft. square Allen settling tank. The overflow from this tank contains a very small amount of phosphate which is settled out in a 20-ft. diameter baffled tank and is then discharged into cars for haulage to the drying plant. The overflow from the baffled tank goes into the tailings sump. The underflow from the Allen tank is discharged into a 200-ton steel storage tank from which it is loaded into cars for haulage to the drying plant.

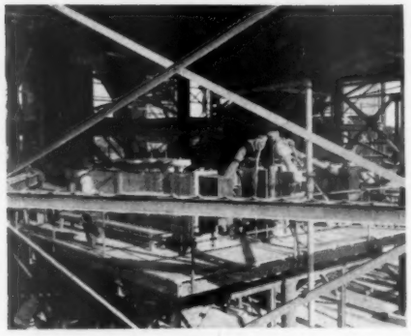
All the equipment in the concentrate department, from the table-feed drag dewaterers on, is controlled from a switchboard in a control room at the end of the table building. Each unit also has an individual local switch.

The middlings from the 32 concentrating tables flow into a sump from which a 4-in. Wilfley pump transfers them to a 10-ft. square Allen tank for dewatering. The overflow of this tank contains a small amount of phosphate and is discharged into the 20-ft. diameter baffled tank already described.

The underflow of the Allen tank is discharged into an 8-ton storage tank from which it is fed into a 3-ft. diameter Denver conditioner. Here reagents are added in smaller amounts and the mixture is discharged by gravity to a Deister Concenco 3-way distributor. This feeds three additional Deister-Overstrom No. 6 concentrating tables whose three products—concentrates, middlings and tailings—flow into the same three sumps as the corresponding products of the 32 tables previously described.

Tailings from all the 35 tables, along with the overflow from the concentrate settling tank, are removed from their sump by an 8-in. Georgia pump to waste. This waste material is sampled regularly by an automatic sampler.

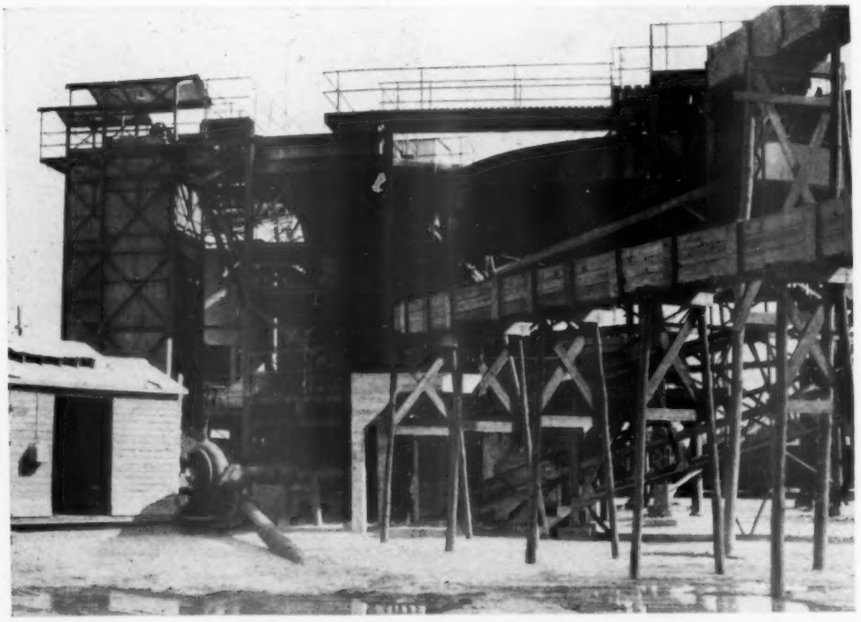
The open-top, bottom-discharge railway cars filled with coarse rock, fine rock and concentrate are hauled over the Atlantic Coast Line Railroad to the company's drying plant at Ridgewood. Here each carload is tested and weighed and the three sizes and various grades of phosphate are dumped from a trestle to separate sections of the wet-rock storage. Tunnel belt-conveyors reclaim the rock from storage and feed it to two oil-fired rotary driers and a rotary kiln from which asbestos belt-conveyors carry it to dry-storage bins.



The 6-pocket sizers under the bowl classifier which prepare table feed.

The practice is to dry all grades of phosphate until they contain only 1½ to 2 per cent. moisture. On the way to storage the dried phosphate is weighed by a Merrick Weightometer and automatically sampled by a General Engineering Co. sampler.

With the kiln and both driers in operation this plant has a capacity of about 130 tons per hr. Box cars are



Another view of washing plant with bowl classifier at right. At left is pump which returns waste material and water into settling pond.

loaded from these bins for domestic shipments to Tampa and other points and into special hopper-bottom decked-over cars for shipment to Port Tampa where foreign shipments are made. The drying plant is also a modern operation using the latest types of equipment and was completely described in the Aug. 12, 1931 issue of PIT AND QUARRY shortly after it went into operation. This plant is modern in every way and is of fireproof construction with Robertson protected metal roofing and siding.

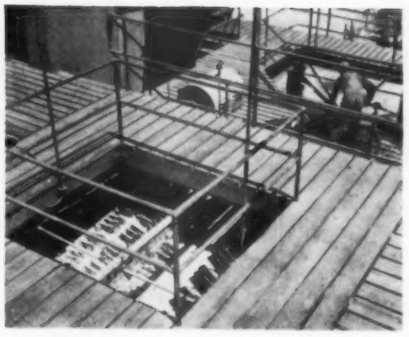
All the fresh-water pumps used in the San Gully operation are located in a hydraulic station near the plant and secure the water from a sump connected to the last of the series of settling ponds into which used washwater is wasted. An Allis-Chalmers 2-stage centrifugal pump rated at 5,000 gal. per min. furnishes water to the hydraulicking guns at the pit. This pump has a head of 487 ft. or 200-lb. pressure at the pump and about 190-lb. pressure at the pit, which is now about 1,800 ft. from the pump.

An Allis-Chalmers single-stage pump rated at 5,000 gal. per min. and 25-lb. pressure supplies water to the table plant and the five Fahrenwald sizers. Another Allis-Chalmers single-stage pump rated at 3,000 gal. per min. and 25-lb. pressure is also connected to the water line feeding the table plant and the sizers.

An Allis-Chalmers pump rated at 2,000 gal. per min. and 80-lb. pressure supplies water to the revolving and vibrating screens, the log-washers and the conical mill. An auxiliary pump of 1,000-gal. capacity is used as a spare. If a drought should cut down the regular water supply additional water is supplied by a 2-stage Layne & Bowler 2,500-gal. per min. centrifugal turbine pump from a deep well.

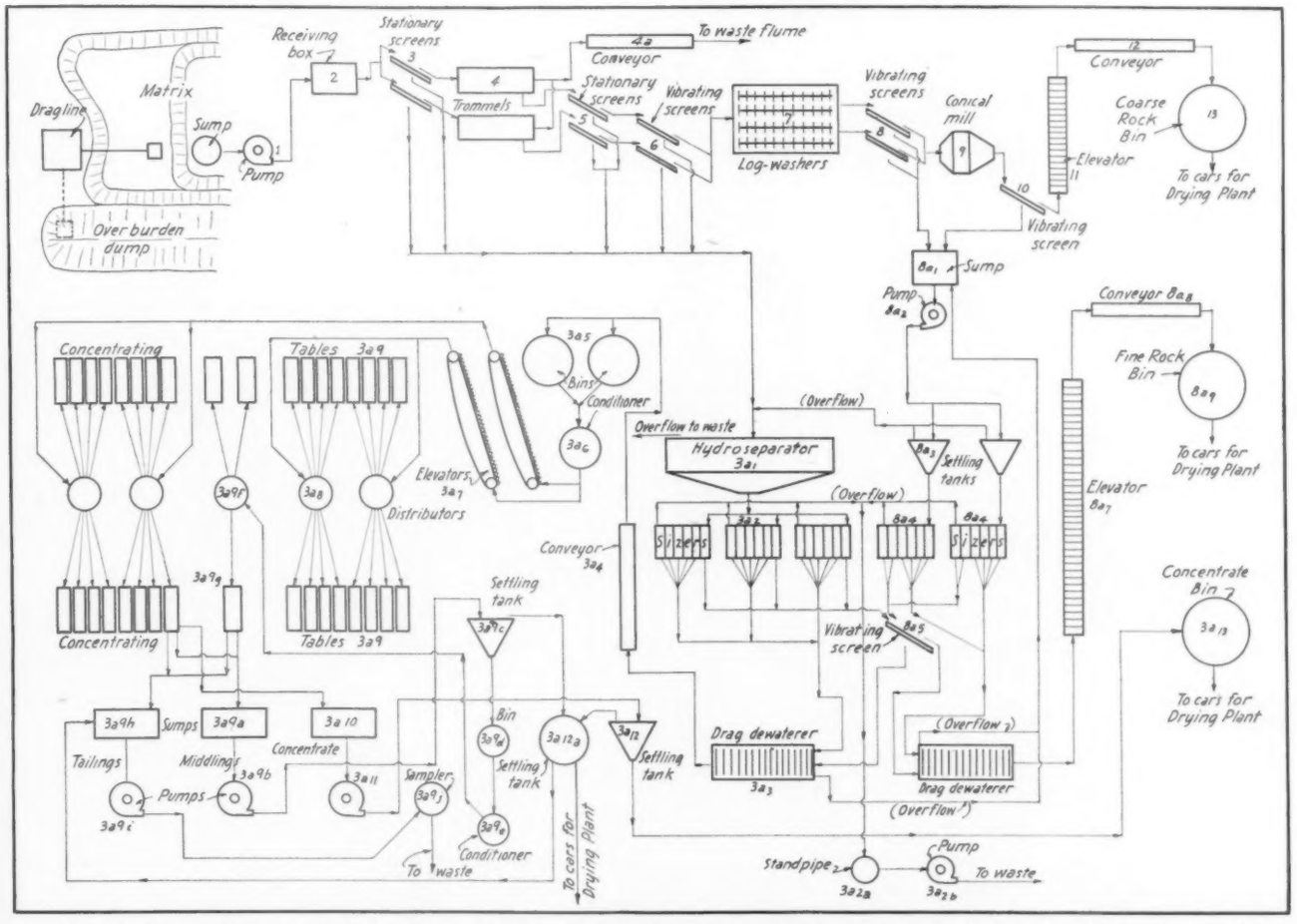
The reagents used are transferred from tank cars by a 3-in. pump to three 15,000-gal. steel tanks. Two ⅜-in. pumps draw these materials from the tanks and deliver them into two small feed tanks above the conditioners. Caustic soda is mixed with water in a third small tank to make a 10-per cent. solution.

Miscellaneous buildings at the washer include a complete and modern field office, a garage for employee's cars, a pump-house with a deep-well pump and cooling system for drinking water, well-equipped machine and electric shops, a storage building, etc. A Caterpillar RD6 Diesel tractor is used to move pipe and equipment around the mines and plant.



The log-washers which break down and remove foreign material.

The new washing plant was designed by B. E. Bushnell, consulting engineer of Tampa, Fla., from a general plan and flow-sheet prepared by the engineering department of the Southern Phosphate Corp. The entire plant is of fireproof steel-and-concrete construction. All the steel for the washer and the steel tanks was supplied by the Ingalls Iron Works and erected



Flow-sheet of the operations at San Gully Washer No. 2 of the Southern Phosphate Corp. This flow-sheet is keyed in with the tabular analysis following.

TABULAR ANALYSIS OF THE OPERATIONS AND EQUIPMENT OF THE SAN GULLY No. 2 WASHER OF THE SOUTHERN PHOSPHATE CORP., NEAR LAKELAND, FLORIDA.—PART I.

(Key numbers refer to corresponding numbers on flow sheet.)

Operation	Key No.	Equipment	Make	Model No., Size, Capacity, or Type	Power Source	Power Transmission
Stripping		Drag-line	Bucyrus-Erie	Electric, 9½-cu. yd., Page bucket	Motors (3)	
Hydraulicking		Pump	Allis-Chalmers	5,000-g.p.m., 2-stage, 200-lb. pressure	750-hp. Allis-Chalmers synchronous motor	Direct-connected
		Nozzles (2)	Georgia	2¼-in. tips		
Pulp Handling and Dewatering	1	Pump	Georgia	12-in., centrifugal	300-hp. motor	Direct-connected
	2	Box, receiving		Steel, 4-ft. by 6-ft. by 12-ft.		
	3	Flume screens (2) (Throughs to 3a1, oversize to 4)	Georgia	Stationary, 41-in. by 12-ft., $\frac{3}{64}$-in. perforated plate		
Mud-Ball Scalping and Disposal	4	Screens (2) (Oversize to 4a1, throughs to 5)	Georgia	Revolving, 4-ft. by 12-ft., 1½-in. perforations	5-hp. G. E. motors (2)	Gearmotors
	4a1	Conveyor (To waste flume with overflow of 3a1)	Link-Belt	Belt, 20-in. by 60-ft., horizontal	5-hp. G. E. motor	Gearmotor
Coarse-Rock Separation, Washing and Storage	5	Flume screens (2) (Throughs to 3a1, oversize to 6)	Georgia	Stationary, 41-in. by 14-ft. $\frac{3}{64}$-in. perforated plate		
	6	Screens (2) (Throughs to 3a1, oversize to 7)	Robins	Gyrex 5-ft. by 8½-ft. single-deck, $\frac{3}{64}$ in. cloth	5-hp. G. E. motors (2)	V-belt
	7	Log-washers (2) (Product to 8, no overflow)	Georgia	21-ft., 2-shaft	25-hp. G. E. motors (2)	Gearmotors
	8	Screens (2) (Oversize to 9, throughs to 8a1)	Robins	Gyrex, 5-ft. by 12-ft. single-deck, 5-mesh cloth.	7½-hp. G. E. motors (2)	V-belt
	9	Mill	Hardinge	36-in. by 8-ft. diameter.	75-hp. G. E. motor	Texrope
	10	Screen (Oversize to 11, Throughs to 8a1)	Robins	Gyrex, 5-ft. by 12-ft. single-deck, 5-mesh	7½-hp. G. E. motor	V-belt
	11	Elevator	Link-Belt	40-ft. bucket, belt 20 in. wide	7½-hp. G. E. motor	Gearmotor
	12	Conveyor	Link-Belt	Belt, 20-in. by 40-ft.	5-hp. G. E. motor	Gearmotor
	13	Tank, storage (To cars for drying plant)	Ingalls	200-ton, steel		
Fine-Rock Separation and Washing		(From 8, 10, 8a6 & 3a3)				
	8a1	Sump		8-ft. by 10-ft. by 10-ft.		
	8a2	Pump	Georgia	8-in. centrifugal	100-hp. G. E. variable-speed a.-c. motor	Direct-connected
	8a3	Settling tanks (2) (Product to 8a4, overflow to 3a1)	Allen	10-ft. square		
	8a4	Sizers (2) (Oversize to 3a2a, first 4 pockets to 8a6, last 2 pockets to 8a5)	Dorr-Fahrenwald	6-pocket		
		(From 8a4 and 3a2)				
	8a5	Screen (Oversize to 8a6, throughs to 3a3)	Link-Belt	Vibrating, 4-ft. by 5-ft. single-deck, 16-mesh cloth	3-hp. G. E. motor	V-belt
Fine-Rock Dewatering and Storage		(From 8a4, 8a5 and 3a2)				
	8a6	Drag dewaterer (Product to 8a7, overflow to 8a1)		5-ft. by 25-ft., Esperanza type	10-hp. G. E. motor	Gearmotor
	8a7	Elevator	Link-Belt	40-ft. bucket, 20-in. belt	10-hp. G. E. motor	Gearmotor
	8a8	Conveyor	Link-Belt	Belt, 24-in. by 70-ft.	10-hp. G. E. motor	Gearmotor
	8a9	Tank (To cars for drying plant)	Ingalls	200-ton, steel		

(Continued on facing page.)

TABULAR ANALYSIS OF THE OPERATIONS AND EQUIPMENT OF THE SAN GULLY No. 2 WASHER OF THE SOUTHERN PHOSPHATE CORP., NEAR LAKELAND, FLORIDA.—PART II.

(Key numbers refer to corresponding numbers on flow sheet.)

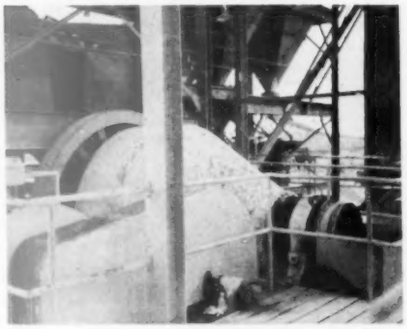
Operation	Key No.	Equipment	Make	Model No., Size, Capacity, or Type	Power Source	Power Transmission
Table-Feed Separation		(From 3, 5, 6 and 8_{a3})				
	3_{a1}	Hydroseparator (Product to 3_{a2}, overflow to waste)	Dorr	40-ft. diameter	7½-hp. G. E. motor	Gearmotor
	3_{a2}	Sizers (3) (Overflow to 3_{a2a}, first pocket to 8_{a5}, last 5 pockets to 3_{a3})	Dorr-Fahrenwald	6-pocket		
Waste Disposal		(From 8_{a4} and 3_{a2})				
	3_{a2a}	Standpipe				
	3_{a2b}	Pump (To waste pond)	Georgia	12-in. centrifugal	300-hp. G. E. variable-speed a.-c. motor	Direct-connected
Table-Feed Dewatering, Storage, Conditioning, and Tabling		(From 3_{a2} and 8_{a5})				
	3_{a3}	Drag dewaterer (Product to 3_{a4}, overflow to 8_{a1})		5-ft. by 25-ft., Esperanza type	15-hp. G. E. motor	Gearmotor
	3_{a4}	Conveyor	Link-Belt	Belt, 24-in. by 165-ft., inclined	15-hp. G. E. motor	Gearmotor
	3_{a5}	Tanks (2) (Reagents added)	Ingalls	300-ton, steel		
	3_{a6}	Conditioner	Denver	7-ft. by 7-ft.	10-hp. G. E. motor	V-belt
	3_{a7}	Elevators (2)	Link-Belt	36-in. inclined bucket, belt 20-in.	10-hp. G. E. motors (2)	Gearmotors
	3_{a8}	Distributors (4)	Deister Concentrator Co.	8-way Concenco, revolving feed	½-hp. G. E. motors (4)	Gearmotors
	3_{a9}	Concentrating tables (Concentrate to 3_{a10}, middlings to 3_{a9a}, tailings to 3_{a9h})	Deister Concentrator Co.	Deister Overstrom No. 6, diagonal deck.	2-hp. G. E. motors (32)	V-belt and flat driven pulleys
Concentrate Dewatering and Storage		(From 3_{a9} and 3_{a9g})				
	3_{a10}	Sump, concentrate		6-ft. by 8-ft. by 12-ft.		
	3_{a11}	Pump	Wilfley	8-in., centrifugal	100-hp. G. E. motor	Direct-connected
	3_{a12}	Settling tank (Product to 3_{a13}, overflow to 3_{a12a})	Allen	10-ft. square		
	3_{a13}	Tank (To cars for drying plant)	Ingalls	200-ton steel		
Concentrate Reclamation		(From 3_{a12} and 3_{a9c})				
	3_{a12a}	Settling tank (Underflow to cars for drying plant, overflow to 3_{a9h})	Ingalls	20-ft. diameter, steel		
Middlings Dewatering, Conditioning and Tabling		(From 3_{a9} and 3_{a9g})				
	3_{a9a}	Sump, middlings		6-ft. by 12-ft. by 8-ft.		
	3_{a9b}	Pump	Wilfley	4-in. centrifugal	30-hp. G.E. motor	Direct-connected
	3_{a9c}	Settling tank (Overflow to 3_{a12a}, product to 3_{a9d})	Allen	10-ft. square		
	3_{a9d}	Reagent tank		8-ton steel		
		Conditioner	Denver	3-ft. by 3-ft.	3-hp. G. E. motor	V-belt
	3_{a9e}	Distributor	Deister Concenrator Co.	3-way Concenco revolving feed	½-hp. G. E. motor	
	3_{a9f}					
	3_{a9g}	Concentrating tables (3) (Concentrate to 3_{a10}, middlings to 3_{a9a}, tailings to 3_{a9h})	Deister Concentrator Co.	Deister Overstrom No. 6 diagonal-deck	2-hp. G. E. motors (3)	V-belts and flat driven pulleys
Tailings Disposal		(From 3_{a9}, 3_{a9g}, and 3_{a12a})				
	3_{a9h}	Sump, tailings		6-ft. by 9-ft. by 12-ft.		
	3_{a9i}	Pump	Georgia	8-in. centrifugal	75-hp. G. E. motor	Direct-connected
	3_{a9j}	Sampler	General Engr.	Automatic electric		
Wash-Water Supply		(From ponds)				
		Pump (To tables & sizers)	Allis-Chalmers	5,000 g.p.m., single-stage, 25-lb. pressure	75-hp. motor Allis-Chalmers	Direct-connected
		Pump (To tables & sizers)	Allis-Chalmers	3,000 g.p.m., single-stage, 25-l. pressure	50-hp. motor Allis-Chalmers	Direct-connected
		Pump (To screens, washers, and mill)	Allis-Chalmers	2,000 g.p.m., 80-lb. pressure	150-hp. motor Allis-Chalmers	Direct-connected
		Auxiliary pump	Allis-Chalmers	1,000 g.p.m. 80-lb. pressure	75-hp. motor Allis-Chalmers	Direct-connected

by the White Construction Co. of Tampa. An unusual feature of this structure is the use of the elevator casings as supports for the conveyor

The belt-conveyor which carries pebble phosphate from washer to concentrators.

runways and other parts of the superstructure. The concentrator building is 170 ft. long and 52 ft. wide and was fabricated and erected by the Maryland Metal Bldg. Co. The company's forces poured all the concrete foundations and placed all the machinery.

All solids-handling in the mine and plant is done with Republic electric-welded steel pipe and with National



The 36-in. by 8-ft. conical scrubber used to break down and remove foreign material.

seamless steel pipe equipped with cast-steel flanges. The electric-welded spiral water pipe in the mine and in the field was supplied by the Naylor Pipe Co. and the galvanized spiral pipe was supplied by the Taylor Forge & Pipe Works.

The Deister Concentrator Co. supplied the 35 concentrating tables, the four 8-way distributors, the 3-way distributor, and all the spray nozzles used on the vibrating screens. The five new vibrating screens were furnished by the Robins Conveying Belt Co. The Link-Belt Co. supplied all the belt-conveyor idlers and pulleys, the elevator buckets and pulleys and miscellaneous pillow blocks, bearings, etc. All the conveyor and elevator belting and suction hose was supplied by the Goodyear Tire & Rubber Co. The Georgia Iron Works furnished the hydraulicking nozzles, the log-washers, the trommels, all the pumps handling solids to and from the washer, and the tailings pump in the concentrator building. The Hardinge Co. supplied the conical mill. The Wilfley Co. supplied the two pumps handling concentrate and middlings in the concentrator building. The Tompkins Mining Machinery Co. supplied the four Allen tanks. The Dorr Co. supplied the Hydroseparator and the five Fahrenwald sizers. The Allis-Chalmers Mfg. Co. supplied all the water pumps and their electric motors. All other electric motors and gearmotors and electrical equipment were supplied by the General Electric Co.

The officers of the Southern Phosphate Corp. are: Chester A. Fulton, president; E. A. Pierce, vice-president and manager; J. C. McLanahan, vice-president; John P. Wheeler, secretary; John C. Fulton, treasurer; G. G. Gleason, assistant treasurer and assistant secretary. C. N. Becker is assistant manager; G. W. McClelland is general superintendent of mines; J. W. Pamplin is metallurgist; and J. L. Sheppard is civil engineer.

Wagon Scraper Does Double Duty at Silica Operation in Illinois

A 7-cu. yd. Continental wagon-scraper was recently placed in service at the silica-sand plant of George M. Pendergast & Co. Inc., at Utica, Ill. and a present-day analysis of this installation brings forth values of interest to those having a sand or gravel digging and hauling problem, according to W. J. Adams of the Continental Roll & Steel Foundry Co., East Chicago, Ind.

This plant, producing sand for foundry and other purposes, has been in operation for many years, during which time they have used an electric cableway drag-line unit for digging out the deposit. Operations to-day extend over a distance of some 450 ft. from the loading belt-conveyor.

The company has long had a problem of eliminating the overburden from the deposit and has apparently solved it by using the new Continental wagon-scraper, together with an Allis-Chalmers tractor for its removal.

From 5 to 6 ft. of clay soil must be removed and on present operations must be hauled approximately 700

The 7-cu. yd. wagon-scraper removing overburden at the Pendergast pit.

Stripping the new deposit while drill works at the left.

ft. where it is back-dumped into a heavily wooded gulley without the necessity of building a spoil-pile.

The scraper unit makes about 1,500 ft. per round trip over a 5 to 10 per cent. grade, the average trip taking from 5½ to 6 minutes.

The unit is moving about 525 cu. yd. per day on an eight-hour shift, showing an average of 7½ cu. yd. of clay soil moved per trip.

After the stripping over a large area is completed, the scraper unit will be employed for loading and hauling the material to a grizzly station from where a loading belt will carry it to their plant.

Only one man is required for the operation of the wagon-scraper unit; depth of cut, loading, hauling and dumping being controlled by the tractor operator through a single lever conveniently mounted on the tractor which actuates a hydraulic pump unit which, in turn, controls the hydraulic jacks mounted on each side of the scraper.

Leaders in the Industry Tell Their Views on

THE FUTURE OF LABOR RELATIONS

This is the last installment of a symposium on the labor question. It consists of letters to the editor, who had asked for these opinions from a number of the industry's leaders with the stipulation that they be published anonymously.

●

It does not seem to me that what I think about the C. I. O. or what effect a decision of the Supreme Court would have is pertinent, because by themselves these details do not mean anything much in the final result.

The evident theory and purpose of our constitution has been gradually changed through "interpretation" throughout its existence. The New Deal will complete the breakdown, unless a reaction and a leader not now evident develop to check the disaster.

Of course, I feel that the world trend toward dictatorship will grow until it gets bad enough to react. The New Deal is one of the world's worst because it is destroying one of the world's best. It will achieve most of its objects, and these objects are and will be worse for the masses.

I suggest an amendment to the Federal constitution to the effect that the function of government is to write into laws the crystallized principles of right and wrong and enforce them; that is should protect and extend the freedom of the individual and in no way attempt to regulate or plan his life. On the negative side all economic questions and provinces should be divorced from political interference or guidance, just as is religion and the church. In other words the political state should do its job of law giver and defender, the province in which it should be competent. The political state in proportion as it intereferes in the religious, or economic, or social lives of the citizens weakens its true functions and must end in destruction. In these functions the state is incompetent and self-destructive as we see before our eyes all over the world.

Natural resource, human labor, and capital are the three and only elements of production and distribution. Natural resource is not capital; no man made it, or earned it, and it belongs to the people. Natural resource is truly social and the income therefrom belongs to the people. Because force and usage and political law have diverted this social wealth to individuals and aggregates of individuals, men are deprived of the natural opportunity to work and unemployment increases in proportion.

Labor organization naturally developed because other minorities have developed and set up for themselves privileges in society, while government was making a mess of its job. In the circumstances the more powerful and ruthless a minority becomes, the more it, for the time, apparently grabs for itself. The C. I. O. is, therefore, logical and effective under the conditions that obtain in a controlled economy. Whether we like it or not, we have got to take it, because we have hypocritically worshipped at the altar of "free economy", while seizing, each group for itself, protection and privilege with the connivance and protection of government. It is all unsound and destructive and the New Deal is finishing the job.

There are only two ways: the way of freedom, and the unrestricted operation of natural law, while government preserves freedom and establishes justice. That was America's dream. The other way is the way of Russia, Germany, Italy and the way that our America is coming to, unless some leader, who knows and sees and will lead the fight, comes.
(*Crushed Stone*)

* * *

SOME of the questions you ask, of course, have their effect upon our company, upon our industry, and upon the workers of the country as a whole, and those interests are not always exactly the same. Furthermore, there is the difference between theory and practice, which is not always easy to reconcile in a single answer. I think quite likely unionization of workers in our industry will come and that, if well managed, the unions may be helpful. If badly managed, they might cause considerable harm in our industry. I think the unions would increase wages more than otherwise would be the case. Increased wages and increased cost of production would raise the price of our product which sells many times in competition with gravel or low-grade materials which are produced more simply than crushed stone, with less labor and not so likely to be unionized. Higher wages might tend to restrict our total sales and production. The higher union wages would yield our men more per hour, but they would work less hours in a year.

We would prefer the industrial union to the craft union. I think the industrial union will predominate. Improvement in machinery, much of which can be run with semi-skilled or unskilled laborers, has cut down the percentage of skilled craftsmen as compared with other workers, in comparison with the conditions some years ago. Therefore the percentage of available members for craft unions is lower than it used to be. We understand that about 14 per cent. of the workers in America are unionized and 86 per cent. are not. The only way to get large numbers of members into unions is the industrial-union plan. The old craft unions have been strongly entrenched and will maintain as vigorous a fight as possible. In our industry there are few men, like shovel runners, carpenters, and machinists, who could join those craft unions in comparison to large numbers of semi-skilled and non-skilled workers, these latter men being eligible for industrial unions, but not craft unions.

It has long been a problem with us to make the shutdowns in winter as short as possible, not only for the sake of the company's business, but for the economic advantage of the workmen. We do not think that wages in our line could be raised sufficiently to provide a year's living expenses in the form of compensation for less than a full year's work, and still maintain a healthy volume of business at the high prices that would be necessary. Our industry in these northern latitudes is compelled to be a seasonal business.

As a theory, we believe wages should be more than just enough to purchase food, clothing, and shelter. We feel that public puchasing power is important to the economic health of the country and are inclined to believe that our business would indirectly benefit by greater public purchasing power

in general in spite of the fact that individual consumers do not purchase our particular product except to a very limited degree. Our product is largely used for public works.

Regulation of the hours of work in our industry on a basis of 35 to 40 hr. per week would introduce some difficult problems. Quarries are usually in a remote location so that it would be more difficult to divide the work and have two shifts than would be the case in many factories. In a seasonal business during the long summer days when contractors are working double shifts and need our material some overtime at our quarries is necessary but not enough to make two shifts. Time and one-half pay for overtime hours worked or some similar method would, of course, be necessary.

As a theory, it would be desirable to have some of the labor-saving gains of labor-saving machinery passed on to workers as compensation for the enforced unemployment resulting from the use of such machinery. In our industry I find it difficult to suggest any method which seems practical.

The answers given in this letter are my own personal opinion as closely as I can state it in reply to your questions without conferring with other producers in our industry. Some of them might have very different opinions. Personally, I have been in four different lines of business during 35 years and by personal experience have learned the difference between a business which runs twelve months a year from one like our own which is not really active more than eight months out of the twelve. I have talked with a good many economists and read quite widely both business economics and business management, and it seems to me that so many times it seems to be assumed that any going business could do something in the way of profit sharing or otherwise distributing some of the gains; but little seeems to be said about sharing losses in those years when the business may not break even. In all four lines with which I have been connected there is a desperate struggle to get the expenses substantially lower than the income and have any profit left. In a food-products line in which I spent two years some time ago it was estimated that our customers, including grocery stores, restaurants, boarding houses, and small hotels, were only successful in about 5 per cent. of the total number of concerns and 95 per cent. did not stay in business more than a few years at the most.

The assumption has been that in the past many concerns or individuals have accumulated large profits, a portion of which should have been distributed in wages so that the concerns themselves would have made less profit and more would have gone to benefit the individual workers. However, while some concerns made large profits, a great many others were failing. On the other hand, the Standard Oil made huge profits but at the same time introduced economics in production so that kerosene oil sold for several cents a gallon less to the general public than it did before. If there had been no Standard Oil Co. or similar organization, no huge Rockefeller fortune would have been accumulated; on the other hand, all the people of the United States would have been paying at least 2 to 5c more per gal. for kerosene and gasoline during all these years.

This is an old story to you, and I am merely touching upon it because it illustrates how complicated the economic situation in a country really is. If overnight all wages and salaries went up 10 per cent. and if over night all prices went up 10 per cent. would there be any improvement in the worker's condition? If wages and salaries went up 10 per cent. and prices went up only 5 per cent., increased consumption by the workers would help reduce production costs and improve the worker's condition still further. There is, of course, a tremendous possible increase in consumption, as the report of the Brookings Institute showed very clearly. As I recall it, in general the report said that if the standard of living of the average family earning below $1,500 per year could be raised to the suggested standard set up by the United States Department of Agriculture, which I think would require a family income of in the neighborhood of $2,500 per year, all the production facilities we had in the country in 1929 would have had to be expanded by 50 per cent. to take care of the demand.

On the other hand, a great many people in the country have been living wholly or partly on income from investments. When profits fall off as during the depression, the purchasing power, wholly or in part, of a good many millions of people is somewhat affected. Then there are three million professional people such as doctors, dentists, lawyers, etc., who are not wage earners, who are affected by rising prices faster than they can increase their own income and who therefore are adversely affected by conditions which may be benefiting industrial workers. All I am trying to say is that I think it is very difficult to state any simple formula that we could adopt and try to work out to benefit the country as a whole and our industry in particular.

(*Crushed Stone*)

THE workers in our plant are completely unionized under a closed-shop arrangement. We believe that unionization of all plants will sooner or later occur and those in the vicinity of the metropolitan areas will be affected sooner. Efficiency at other plants has been affected considerably more than in our case. This condition seems to be a natural reaction from unionization when progress in other industries has also been scrutinized.

Momentarily, unionization with its accompanied wage increases will improve the economic status of the workers. This movement is usually coupled with the shortening of the hours, which latter fact has a good chance of completely nullifying the good to be obtained from an increase in the hourly rate. In other words, the worker may not in many instances receive any more than he did before over a year's period. In the meantime the general rise of rates per hour and shortening of hours is causing an upswing in commodity prices. I am personally convinced that increasing the wages will not necessarily improve economic conditions, but rather that improvement of economic conditions, such as prosperity, will of its own accord improve wages. This has been the history without unionization, as I understood it. Being near a metropolitan center we are immediately placed on a wage-scale basis, which makes it difficult to compete with the out-state competition with which much of our products come in contact.

Based on an actual comparative observation of plants under a horizontal basis and those on a vertical basis—the latter known as the industrial—I find that those on a vertical basis maintain their efficiency much better than the other type. The vertical plan naturally allows more harmony within a single plant operation and it has been proved that the workers team up together in their daily work more satisfactorily. Which one will predominate, will depend largely upon the weight of the artificial factors that are now prevalent.

We do feel that we should be concerned about the economic situation of our workers. We have definitely made moves so as to reduce the number of interruptions and irregularities in our production, to provide steady employment and, of course, continuous operation of our plant. To work out in practice a plan that will guarantee the worker a definite yearly income is difficult and practically impossible, simply because the producer of sand and gravel, who is the seller, has no con-

(Continued on page 52)

By N. C. KYRIACOU, D. Sc.
St-Germain-en-Laye, France

VIBRATING DEVICE FOR DRYING CEMENT PASTE

A NUMBER of wet-process cement plants which are equipped with rotary kilns have added to their "thermic machine" a subsidiary apparatus of recent invention, consisting of an independent device for the drying of cement paste.

As I have pointed out elsewhere[1], the rotary kiln must be considered as being made up of two zones of heat transmission, each working under entirely different conditions: (1) the clinkerizing zone, in which 90 per cent. of the said heat transmission is effected by radiation, and (2) certain other sections—calcining zone, dehydrating zone—where the heat is transferred by convection. However, if, in the rotary kiln, the heat transmission by radiation is satisfactory, the same can not always be said for the heat transmission by convection, the efficiency of which is extremely low. The best proof of this lies in the high temperature of the combustion gases as they leave the kiln.

In effect, whereas the theoretical requirements for insuring heat transmission by radiation are present, *viz.* free development of the flame, low kinetic velocity of the combustion gases and high temperature of the medium, this is not the case where heat transmission by convection is concerned, for these phenomena obey very different laws. Intimate contact with the material to be treated and very high kinetic velocity of the combustion gases are required. These conditions, however, are not to be found in the rotary kiln, and this is the explanation of the poor efficiency of this apparatus. Practical tests of an exhaustive nature have shown that in a rotary kiln used for the manufacture of cement by the wet process, the raw paste may travel half way down the kiln before any change in composition takes place. With a view to remedying this state of affairs wet-process cement kilns have been coupled up with a preparatory or, more correctly, a dehydrating or drying apparatus, the object of which is to dry and to granulate the cement paste and thus to supply a properly prepared material for subsequent treatment in the rotary kiln.

As regards the working of the process, I am not in agreement with certain other specialists who are of the opinion that the heating gases should be in direct and permanent contact with the material to be treated, if the best results are to be obtained from this treatment. I maintain that drying machines loaded with metal bodies function on the principal of heat accumulation. For if we consider the thermic capacity of the hot gases and that of the solid bodies, the extremely low value of the former is immediately evident. Thus, 1 cu. m. of combustion gases at a specific heat of 0.40 only represents 400 calories, whereas the same cu. m. of cast iron represents 800,000, that is to say, a thermic capacity 2,000 times as great.

This explains the successful results obtained by filling revolving screen driers, kilns, etc. with metal bodies. These bodies are brought to a high temperature and to a high thermic content by the action of the hot gases. If the paste to be treated is fed into the apparatus rationally, evaporation and drying take place immediately, for a large quantity of calories is transferred in an extremely short space of time. The 614 calories required to evaporate a kilogram of water are supplied, so to speak, at high tension and the reaction is instantaneous. The annoying tendency to become sticky and to form a deposit, displayed by the paste in the gradual drying process, disappears. The granulated paste skins off of itself and the heat-accumulating bodies are ready to be charged anew, and for the process to be repeated. The treatment is ameliorated by imparting a certain movement to these bodies.

The various devices for doing this, which at present hold chief rank on the market, act on the rotary principle. In one case a drum is filled with metal rings; in another, chains are employed. In the first case the heat-accumulating bodies used consist of hollow cylinders, equal in length and diameter. They are made of heavy plating or—particularly in the industry under consideration—of hard cast iron. One cu. m. filled with heat-accumulating bodies so constituted contains 250,000 15-mm. rings, 55,000 25-mm. rings and 6,700 50-mm. rings. The cast-iron cylinders of 50-mm. length and diameter, with 3-mm. walls, weigh 1,300 kg. per cu. m. and offer a surface of contact of 120 cu. m. However, the hollow balls which are now readily obtainable might be used for the same purpose.

The system of treatment must be planned in such a way that the cement paste is adequately fed to the heat-accumulating bodies, which have been previously brought to a high temperature. As the metal bodies charged with a high thermic potential come into contact with the aqueous particles a heat discharge takes place immediately, resulting in the evaporation and desiccation of the cement paste. The raw cement powder, thus deprived of its aqueous content, takes on a granulated form and, owing to the rotary movement of the kiln, is directly fed into the latter. Theoretical and practical data show that 10 cu. m. filled with heat-accumulating bodies is required for treating 150 tons of cement paste containing 35 per cent. humidity and corresponding to 100 tons of clinker.

As has been already explained, these hollow rings used as heat interchangers and receivers have the great advantage of providing a very large surface of heat transmission for an extremely small volume. Besides, the circulation of the hot gases necessarily gives rise to eddy-currents which greatly improve the heat transmission. The scaling of the bodies, so as to obtain a clean surface free from any deposit of solid products which might disturb or even prevent the said heat transmission, is insured by the shock of their impact, under the influence of the rotary movement imparted to the drum loaded with these bodies.

Recent years, however, have brought about an important development in this domain and the revolving screen of classic design is being replaced by a competitor of greater merit. I am referring to jolting screens, vibrating grizzlies, and similar devices for size classification. The disadvantages of the revolving screen are only too well known. The active surface of such a screen represents only one-seventh of its total surface. The wear and tear is excessive, by reason of the presence of bearings, rollers, crown wheels. It must be of sturdy construction, with a complicated drive mechanism. Vibrating screens, on the other hand, are distinguished by the fact that their working surface is equal to their entire surface. This results in a saving of

[1] *A New Type of Cement Kiln.* PIT AND QUARRY, April, 1937, p. 55-56.

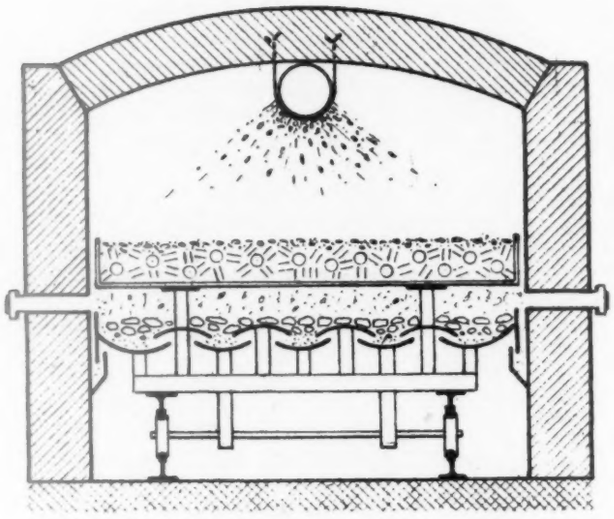


Fig. 1

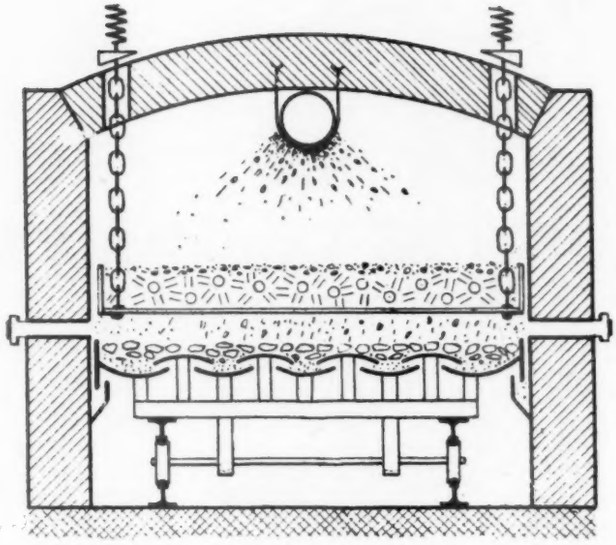


Fig. 2

initial expense and a saving in up-keep charges. The comparison of this equipment, which, moreover, has many points in common with my vibrating-sole flame-furnace, has suggested to me the design of a cement-paste drying machine based on this principle.

On a porous surface, provided by a specially-built vibrating screen allowing the gases to pass through but retaining the granulated product, is laid a shallow bed (about 30 cm. deep) of heat-accumulating bodies, cast-iron rings 50 by 50-mm. or 80 by 80-mm. (Fig. 1). The current of gas is drawn through this bed from top to bottom and the high efficiency of inverse heating may be counted upon. Let us consider the machine in running order. A vibrating movement is imparted to the screen, which in turn communicates this movement to the heat-accumulating bodies, that is to say, the rings are unceasingly shaken together. As noted above, the hot gases are drawn through the system from top to bottom and give off their calories, cooling down to about 120 deg. C. The heat-accumulating bodies are thus raised to a high temperature and charged with a corresponding calorific potential, and the cement paste is then adequately fed to them. A system of intermittent pulverization at high pressure is to be recommended, for this enables the bodies to be properly recharged with calories. The finely-sprayed particles of the cement paste come in contact with the heat-accumulating bodies and immediately release their humidity, become dehydrated, and, helped by the vibrating movement, reach the screen which, owing to its special design and to the movement imparted to it, forces them forward and feeds them to the calcining zone of the kiln. Gas-tight connection between the two parts is insured by a sliding ring, which allows the kiln to rotate but which prevents any excess air being drawn in.

Let us consider the vibrating device situated in a zone which is reached by the hot gases at a temperature of about 500 deg. C., that is to say at about 40 m. from the flame. The screen might be given a length of about 20 m. and a width of 2.5 m., for this section need not be coated with fireclay on account of the relatively low temperature which would be communicated to the sheeting. This gives a total surface of 50 sq. m. Loading with heat-accumulating bodies to a depth of 30 to 40 cm. would be amply sufficient to supply the necessary mass for dehydrating this particular paste. It is clear that the device might equally well be hung from the roof of the kiln and be driven independently (Fig. 2), instead of being placed on the vibrating screen as shown in Fig. 1.

The essential advantage of the system, if the saving in initial expense and up-keep costs is left out of consideration, is the great ease with which an adequate draft can be obtained, which means considerable reduction in the power required to drive the fan working the system. It is obvious that a screen of 50 sq. m. area offers far less resistance than a constriction of several square metres represented by the section of a revolving screen loaded with heat-accumulating bodies and through which the combustion gases must be drawn.

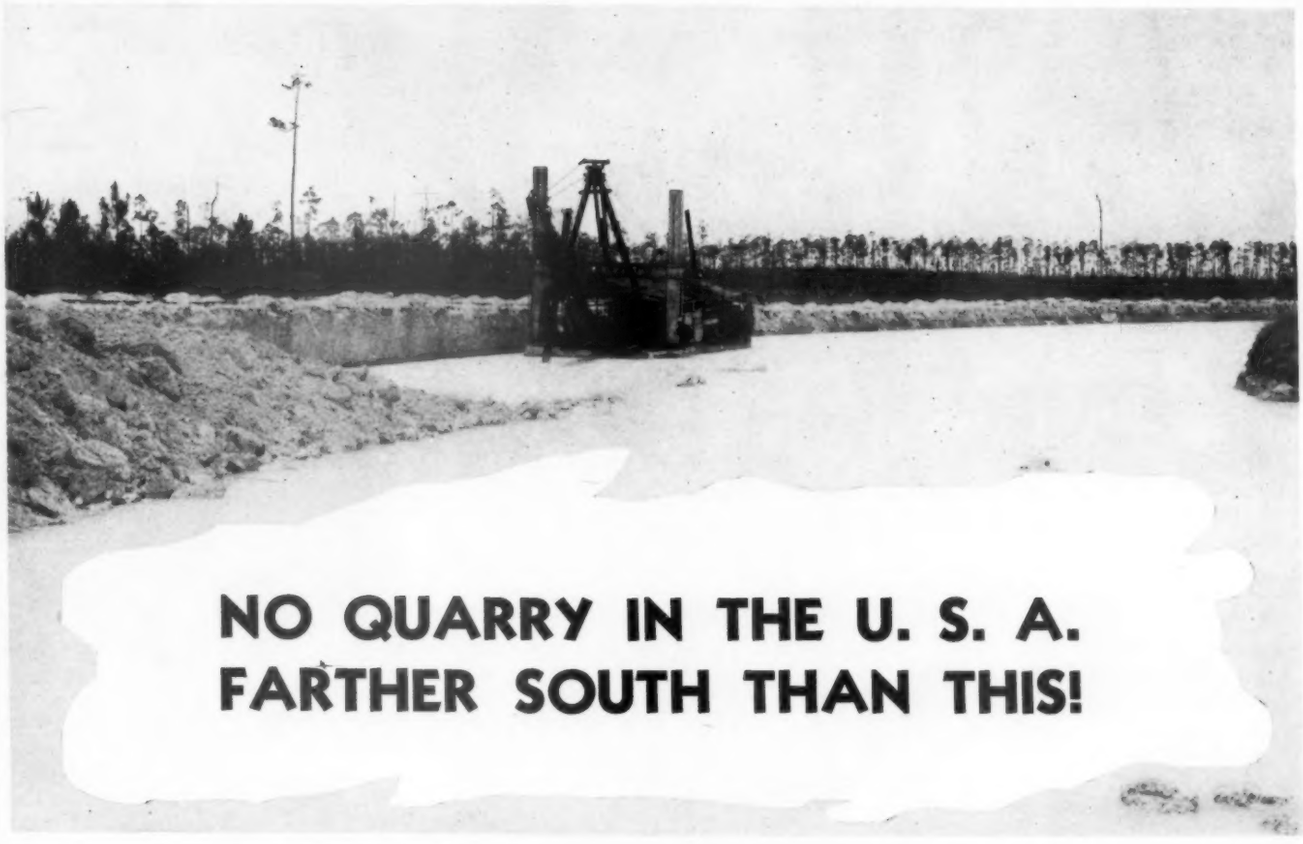
Labor *(from page 50)*

trol over the purchasing of his material. Sound adjustment, tempered with knowledge of past years' experiences, is the only way to work it out.

I believe that wages should be somewhat greater than the bare cost of supporting the workers and their dependents, so as to give them purchasing power beyond the bare necessities. Public purchasing power in my estimation is only a small part of the purchasing power that is naturally available. The natural purchasing power of all persons will completely submerge the public governmental purchasing power if allowed to run its natural course. The government's purchasing power did have some benefit in tiding over a bad period, but it should be controlled and reduced as natural purchasing power increases.

The artificial regulation of work, I personally believe, is going to retard prosperity from now on. I gather this impression because many men are willing to work more hours to develop a larger annual income, which annual income is the real determining factor as to how much a worker has available for purchasing commodities. I believe that the total weekly hours of labor will, on the average, be controlled but that the government will go too far, and particularly that it will affect our international relationships, due to an increase in commodity cost which will be much greater than those of other countries, and will in time react against our own local prosperity. In our industry we do not believe the weekly hours should be less than 48.

Contrary to the belief of many, I personally am under the opinion that labor-saving devices assist labor rather than hurt it. Momentarily some are thrown out of work, it is true, but in the long run they make possible lower commodity prices and more ease for the workers. (*Sand and Gravel*)



NO QUARRY IN THE U. S. A. FARTHER SOUTH THAN THIS!

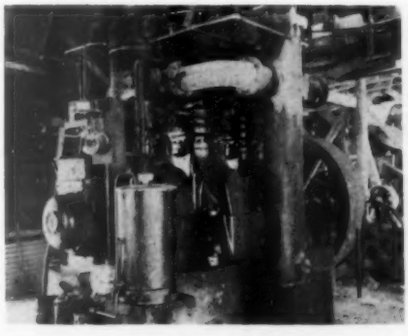
Steam dredge with 1½-cu. yd. dipper loading the coral rock into dump cars on the bank.

THE plant of the Naranja Rock Co. at Naranja, Fla., has the distinction of being one of the southernmost aggregate-producing operations in the United States and without question is the southernmost crushed-stone plant. It is also an efficient, modern plant capable of producing a high-grade concrete aggregate at low cost. It has an hourly capacity of 60 to 75 tons of concrete aggregate, or 150 tons of road rock. Most of its output is used in the city of Miami and its suburbs. The high lime content of this rock makes it ideal for waterbound roads with a bituminous or oiled surface coat.

When founded in 1913, this firm was known as the Ojus Rock Co. and operated a plant at Ojus, Fla., 12 mi. north of Miami. Shortly before the great Florida boom, sand pockets in the deposit made it difficult to keep the sand content of the product within the desired limits and a search was begun for a better deposit. This was found at the present site near Naranja, 20 mi. south of Miami. The Ojus deposit was presented to Dade City and was named Greynolds Park in honor of A. O. Greynolds, president of the company. The new plant was completed in 1923 and has been in steady operation since that time.

Since the plant was built, many improvements have been made to keep pace with more exacting specifications and to reduce production costs. Up to 1931 only road-base rock was produced and a washer was installed in that year to make possible the production of concrete aggregate. The primary crusher was installed in 1927, the secondary crusher in 1931 and the reduction crusher in 1934. The Diesel engine which drives the entire plant was purchased in 1927.

The deposit is a coral rock with a $CaCO_3$ content of from 96 to 98 per cent. There is no overburden and the depth of the deposit is unknown. About 10 ft. of the rock is above the water table. Excavation is being carried on to a depth of only 6 ft. below water-level as it is cheaper to buy additional land than to dig deeper. Blast holes are sunk by an air-drill mounted on a crawler rig, and air is supplied by an Ingersoll-Rand compressor mounted on a wheeled frame. Holes are drilled 16 ft. deep and on 3-ft. centers both ways. Usually 24 sticks of du Pont 40-per cent. dynamite are used in each hole. From 150 to 200 holes are detonated at a time by means of electricity.



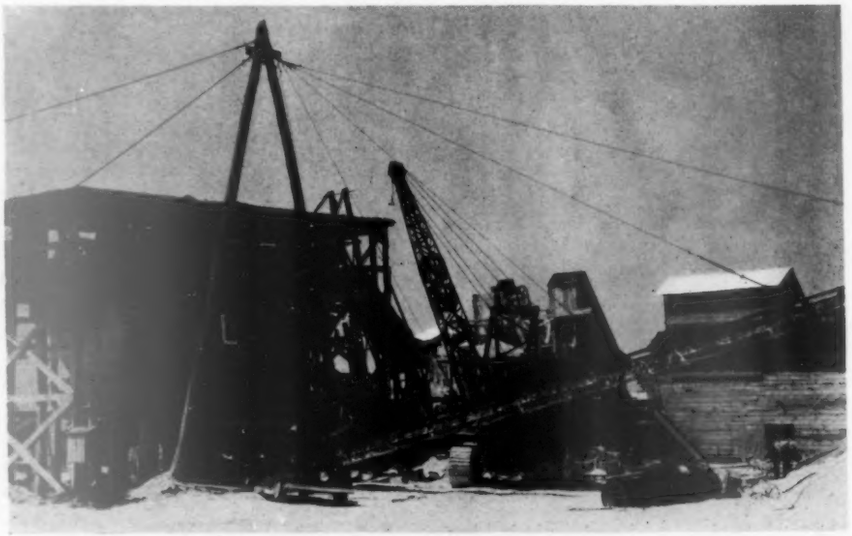
The 3-cyl. 180-hp. Diesel engine which drives the entire plant through belts from a line-shaft.

The rock is excavated by a Marion steam dredge which has a 1½-cu. yd. dipper. The original wooden hull was replaced in 1925 by a steel hull furnished by the American Steel Dredge Co. Because of the high cost of coal, wood is used as fuel.

The dredge loads the stone into 8-cu. yd. Western side-dump cars which are hauled to the plant by a 65-ton steam locomotive. The track parallels the working face of the deposit and is moved back periodically as succeeding cuts are made along the full length of the pond. At the plant the stone is discharged into a track hopper feeding the 36-in. by 48-in. McLanahan and Stone single-roll, sledge-wedge type primary crusher. The minus 3-in. crusher product is discharged into an Acme inclined chain-bucket elevator.

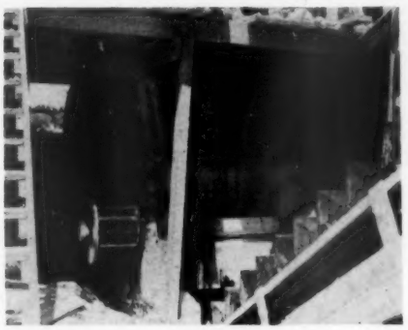
Plant of the Naranja Rock Co. as viewed from the quarry track.

The air-drill used at the deposit is mounted on the frame of a small crawler crane. The compressor on the rail car supplies the air.



Storage bins with portable conveyor used to load cars from bins or to stock-pile. Ordinarily the crane is employed to load out from the stock-piles.

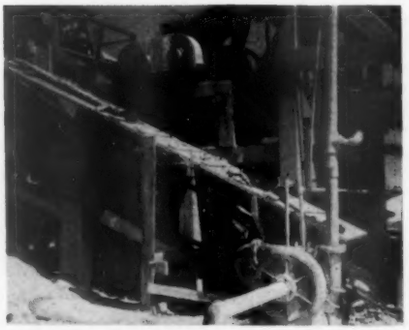
When road rock is being produced, this elevator discharges the product through a chute into cars for shipment. Otherwise the stone is discharged from the elevator into the 24-in. by 42-in. Ocala secondary crusher which is of the corrugated single-roll type. The product of this crusher is discharged over a stationary inclined screen which has ¼-in. openings and is equipped with washing sprays. The



The 36-in. by 48-in. single-roll crusher with elevator which can discharge to cars or secondary crusher.

fine material passing through this screen goes to a 4-in. Wilfley sand pump which discharges it on a stock-pile. This material is sold as concrete sand and screenings and requires no further processing.

The material coarser than ¼-in. is fed by a Link-Belt bucket-elevator to a 30-in. by 12-ft. Ocala revolving washing screen, the main barrel of which has ¼-in. by 1-in. slotted openings, while the outer jacket has 1/32-in. by ½-in. openings. The fine material



The 4-in. centrifugal pump which discharges sand to the stock-piles. Double-roll crusher above.

is sold as chats and is discharged into a bin. The oversize goes to a 54-in. by 20-ft. revolving screen with a single jacket. The openings on this screen can be changed to meet requirements, and four through sizes and oversize are produced. The four sizes of rock are discharged into bins. The oversize goes to an 18-in. by 24-in. McLanahan &

Stone double corrugated-roll crusher which discharges its product into the elevator feeding the washing screen. Each of the four storage bins holds 25 cu. yd. of material. Chutes feed the rock from these bins to a Barber-Greene 18-in. by 75-ft. portable belt-conveyor supported by cables on a wheel-mounted A-frame. This convey-

Oversize from the screen is recrushed by the 18-in. by 24-in. double-roll machine.

or, driven by a 2-cylinder Novo gasoline engine, can transfer the rock from any bin to stock-piles or to cars or trucks for shipment. A Northwest crawler crane with a 1-cu. yd. clamshell bucket reclaims material from the stock-piles to cars or trucks.

All the plant equipment is driven by belts from a lineshaft driven through a clutch by a 180-hp. Fairbanks-Morse 3-cylinder, Type Y Diesel engine. This engine was purchased new in 1927 and has been operated 10 hr. daily the year around since that time. The only major repair necessary in over 10 yr. of operation was the replacement of the four main bearings due to the clogging of the oil lines. According to I. W. Hunt, superintendent, the engine consumes only 75 gal. of 8c. distillate and less than 1½ gal. of lubricating oil in a 10-hr. day. This economy of operation is in contrast with the high charges made by local utilities companies for electricity. Mr. Hunt states that a $300 minimum stand-by charge is made regardless of the amount of current actually used.

Because of its high lime and water content this rock cakes and builds up on processing equipment. By the use of water sprays on the crushers and screens this condition is eliminated. Water is supplied from a 25-ft. well by a 4-in., 2-stage centrifugal pump.

Gibsonburg

(from page 39)

drators. These are batch-type machines designed so that the batch is visible at all times, enabling the operator to check the progress of hydration. Four 2,500-lb. batches per hr. are fed to each hydrator.

Hoppers with Raymond feeders under the hydrators serve conveyors which carry the hydrate to an 800-ton curing bin. This feeds a Raymond automatic throw-out pulverizer and a Bonnot mill. The product of these mills goes to bins over 4-tube Valve Bag packers. To produce lime plaster some of this lime is conveyed to a Broughton mixer through a hopper on a scale and is automatically weighed and fed by a screw-conveyor controlled electrically. Packing of the lime was formerly done with 9 men on several shifts, but now only a single shift of 4 men is necessary in spite of the added capacity from the four new kilns.

The company has its main office and chemical laboratory at the plant, making possible close supervision of the operations and the quality of the product. Every car-load of finished hydrate is tested for plasticity before it is shipped, and many other quality and control tests are made.

Legislation

(from page 40)

enforcement of the law. This plan would include fair trade practices as part of the wage-hours law; and apparently it would be the purpose to enforce the law by securing results through application of its effects as well as by direct enforcement. It is quite probable that eventually the debate over this wage-hours bill may bring into consideration the plan so inexplicably produced suddenly early in summer by Attorney-General Cummings, suggesting the inclusion of the study of laws, patents, taxation, manufacturing, farming as well as labor, and to devise methods of more powerful enforcement.

Discussing the bill as reported by the House Labor Committee, Executive Secretary Vincent P. Ahearn of the National Sand & Gravel Assn. declared:

"No consideration whatever is given to varying conditions in many industries, nor is there any attempt to understand and analyze the problems of seasonal operators or industries with continuous-process necessities. The thought must be lurking in the minds of some members of the committee because the report stated that the law may cause 'some inconvenience, and possibly financial loss, for a short time, but the fact that a tremendous number of injustices will be cured fully justifies the inconvenience and even the loss'. This reflects the naïve assumption that the inconvenience and loss will be visited only upon employers, and yet there is intelligent testimony before the committee that arbitrary control over industry from Washington will inevitably result in reduced employment and higher prices.

"The Green amendments, submitted while the A. F. of L. was trying to make up its mind whether it wanted the bill or not, added new complications. In substance they provided that a labor-standards order shall be issued by the board only if it finds that collective bargaining—minimum wages or maximum hours—does not cover a substantial proportion of the employees, or that existing facilities are inadequate or ineffective. The board is further prohibited from issuing an order covering any occupation which establishes for any locality a minimum wage which is lower or a maximum work week which is longer than those prevailing for like work done under substantially like conditions in such localities. And the board is required to accept as *prima facie* evidence the minimum wage and maximum week established for any occupation in any locality by collective-bargaining agreements.

"Under these provisions no order will be issued by the board until it has determined as to a given occupation whether collective bargaining 'is inadequate or ineffective'; it must not issue an order establishing working conditions less beneficial to the employees than those now prevailing in a given community; and it must be guided by collective-bargaining agreements as to minimum wages and maximum hours in the fixing of those standards for any occupation in any industry in any locality. This is a deliberate proposal to make labor unions a part of the government. In our own industry collective-bargaining agreements have been signed in some localities, but essentially we remain an open-shop enterprise. If the Labor Standards Board should apply the Green amendments in the manner apparently intended, there seems no reason why the board should not accept the most drastic provisions of the agreements, as the 'appropriate' standard for the entire industry. To borrow a phrase from Mr. Cardozo, this is delegation of power running riot.

"The Black-Connery bill is the kind of legislation upon which the average member of the Congress is sensitive to the opinion 'back home'. The most articulate lobby groups of Washington are clamoring for the bill, and they are making the direst threats about defeating any Senator or Congressman who votes against it.

"It seems difficult to believe that it will pass, if it is fully understood. It is the most drastic legislation proposed

(Continued on page 60)

By D. R. EGBERT

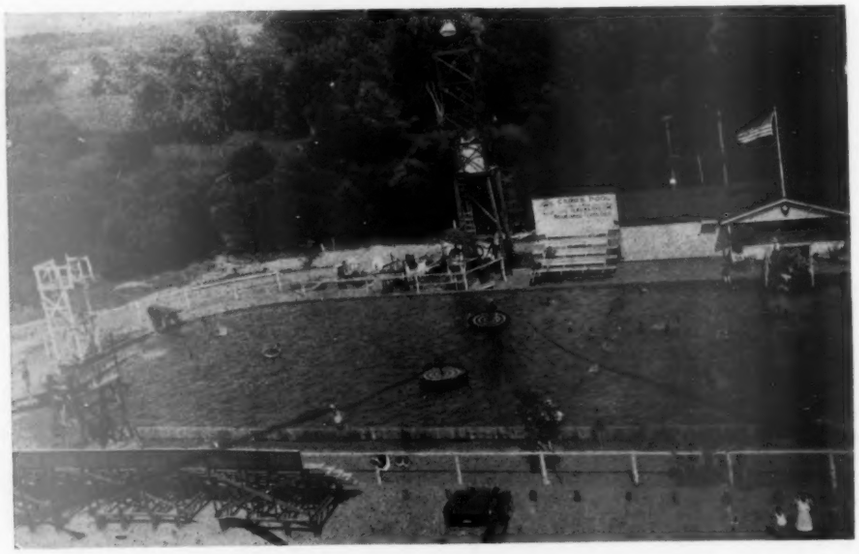
SWIMMING POOL AND 50 CHILDREN HOLD GRAVEL-OPERATOR R. E. CARR'S INTEREST

WHO said there was no human interest in the sand-and-gravel business?

If you want to find it in large measure, call when in the vicinity on R. E. Carr, of the Carr Sand & Gravel Co., Ames, Ia., and you will meet an operator who has expanded his business to the extent that it could properly be called unique—alone in its class.

Besides producing sand and gravel, Mr. Carr operates a large outdoor swimming pool and recreation park, in Ames discovered the best swimming hole in the county. Gradually the fame of the place spread until as many as 400 to 500 swimmers, young and old, would come there on Sundays and holidays.

It then occurred to Mr. Carr that he might commercialize the popularity of the swimming hole, so he decided to build a modern pool where the people of Ames could disport themselves in safety and under sanitary conditions. With the aid of local bankers, he constructed a $20,000



This pool built by R. E. Carr of the Carr Sand & Gravel Co. holds a half-million gallons of water. About 50,000 persons use it annually.

does some farming and rears children — other people's children — approximately 50 in the last 30 years; but we are getting ahead of the story.

To start at the beginning, Mr. Carr and his wife moved to a beautiful 45-acre tract on the Skunk River, just outside the northern limits of Ames, about 1910. Incidentally, the river belies its name. Then and there Mr. Carr became a sand-and-gravel producer simply by hitching a team to a scraper and removing an excellent grade of material from the sand bars in the stream.

Eventually he went to dredging and not long afterwards the youngsters plant that accommodates 50,000 persons annually.

All the materials used in constructing the pool, excepting the cement and steel, came right out of the river less than 100 yards away.

Water for the pool is filtered and chlorinated, tested three times daily in season, and subjected to laboratory examination every week. Lifeguards are provided and while they have to do an occasional rescue there has never been a serious accident or drowning since the pool was built in 1926.

Mr. Carr has the coöperation of the Parent-Teachers' Assn. of Ames and there has been a regular program of swimming instruction at the pool for some years with as many as 750 children in the classes.

From what has been said before, the reader would assume that Mr. Carr liked children, having reared some 50 of them in 30 years, and here is how that "enterprise" developed. Being childless, Mr. and Mrs. Carr took in a few children through social agencies to fill the empty place in their home. Some of them stayed a few years, others longer. Three of them were finally adopted. To-day the Carr table finds eleven around the board . . . . and are the Carrs proud of their charges!

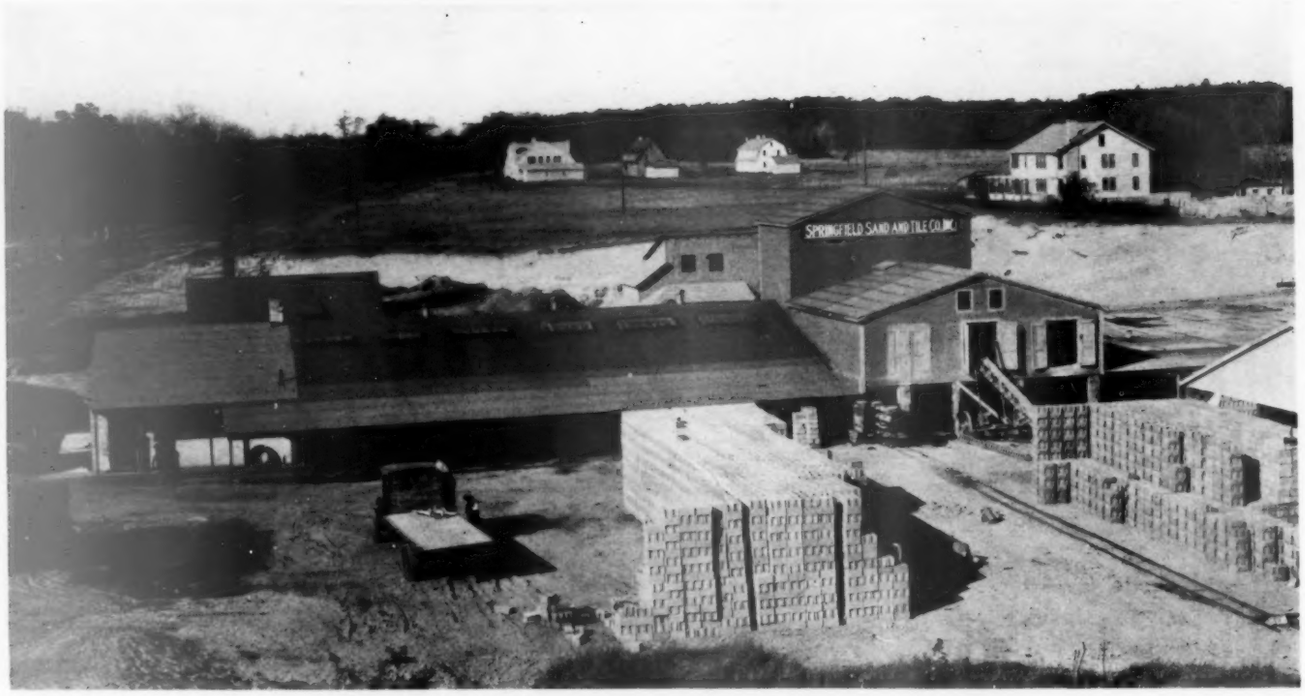
As to farming, Mr. Carr says he just "fiddles" with it as most of his land is used for park purposes in connection with the swimming pool. However, there are enough cows in the barn to supply all their milk and some to sell, and enough chickens to lay plenty of eggs and furnish part of the menu needed for eleven healthy appetites.

The Carr sand-and-gravel plant has produced and sold an average of 30,000 tons annually. Heretofore the dredging outfit has always been carried on a scow. Last winter, however, the Skunk River lived up to its name for once and the ice tore the outfit to pieces. The wrecked scow to-day is 10 miles down the river and replacing it is a pontoon built of 90 alcohol drums that serve the purpose even better. An old Cadillac V-8 engine furnishes the power and is connected to a Fremont pump through a Foote speed-reducer. Mr. Carr built his own elevator and even his vibrating screen.

There's the picture of the Carr Sand & Gravel Co., and its subsidiary enterprises, and if it has an exact counterpart we'd like to know where to find it. We repeat, if you're ever near Ames, go out and call on Mr. Carr, and you'll find something as interesting as the story — and oh, yes, we nearly forgot — Mr. Carr is planning to establish a trailer camp next. Just no stopping this man!

P AND Q
PROFITABLE
New Products
SECTION

PROFITS FROM CONCRETE BURIAL VAULTS



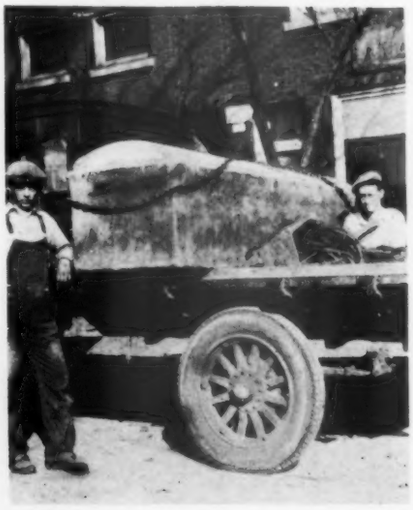
Many plants, such as this one, have found vaults to be a profitable sideline.

By D. R. (Spec) COLLINS

BOB DAMAREL, sand-and-gravel producer, has recently expanded his business by taking on the manufacture of concrete masonry units and precast-concrete joists. In order to keep production up during the winter months and retain in his employment several key men that he knows will be of value in his manufacturing processes next year, he has been looking for another concrete specialty that he can manufacture.

Bob wrote me a short time back wondering what I knew about concrete burial vaults and whether he could go into the manufacture of this item without too great an investment and what the possibilities were. My reply to him was as follows:

"Dear Bob.—Probably the first thing you want to do in considering the burial-vault business is to consider your potential market. That is pretty definitely fixed for any known area. First you get the population of the area and figure that normally the number of deaths will be 10 for each 1,000 population. That's your potential market. You'll have competition, of course, from other vault manufacturers. The total amount of business you do is dependent on the tie-ups that you make. Inasmuch as your product will have to be trucked and you will be called upon to install it in the grave, I wouldn't advise you to bite off too great a territory in making your computations because very often there are two or three funerals a day and unless you are able to give excellent service there is bound to be dissatisfaction and you will lose customers.



The same trucks used to deliver concrete blocks can be used to deliver vaults.

"Your direct customer is going to be the funeral director. After you've determined the potential market in the territory you want to cover, you'll want to make a very thorough survey of the funeral directors in your territory, finding out, of course, who does the most business and whether or not he is already tied up with a concrete or some other vault manufacturer.

"It would be rather difficult for you to sell your vaults direct, but the funeral director is usually entrusted with making all the arrangements and can usually make the sale easily. As quickly as you decide on the funeral directors that you'd like to do business with, and before you buy even a nickel's worth of equipment, you will, of course, want to talk to them, tell them what you intend to do and come to a complete understanding as to the price you will charge these directors, their selling price, and of course, the services that you are going to render. These services will be making the vault, setting it in the grave, and sealing it.

"Remember that in making these arrangements with the funeral directors you have other obligations besides manufacturing and placing the vault. You will want to consider some sort of advertising that the director can use in pushing your product. My first sug-

gestion would be a very carefully prepared, well-printed, good-looking, small envelope inclosure or direct-by-mail piece. The facts about your vault should not be overstated, but in a dignified, emphatic manner you will want to tell the advantages of the vault you intend to manufacture. These can be put in the hands of the funeral director and he in turn can place them in the hands of people who will be buying the vaults. This piece need not be expensive but it should be by all means impressive. The funeral director will perhaps be glad to assist you in preparing such a circular because it will mean business to him as well as for you. Another thing I believe you can do is to carry small one-column advertisements near the obituary columns of your local papers. These will impress the public with your name and will considerably reduce the sales resistance on the part of the funeral director.

"And remember, in connection with advertising, the best advertisement you can possibly have is a quality vault, well-made, clean-appearing, and workmanlike.

"Now as to the equipment for manufacturing these vaults. Usually vaults are 26 in. deep, 33 in. wide, inside dimensions. The length varies up to 88 in. but you will find those most commonly used are 84 in. and 64 in. long. Roughly, the following amounts of material will be necessary for the average size vault: 4½ sacks of Portland cement; 6.2 cu. ft. of sand; 6.3 cu. ft. of gravel, running ¼-in. to ⅜-in.; 30 lb. reinforcement. You can figure roughly about 12 hrs. of labor to each vault. This will give you an idea of costs, to which, of course, you must add your profit, overhead, delivery, setting, sealing and other charges common to the operation of any business.

An attractive product, plus clean, well-kept delivery equipment, is an asset to the vault manufacturer.

"I don't worry a great deal about your method of manufacturing. You are an engineer and you know good concrete, and that is the first essential in the vault business. A strong, watertight product, dense enough to resist the attack of soil chemicals and built well enough to support soil loads upon it.

"Just a few words on manufacturing. Experience shows that a mixture made up of well-graded sand and pea gravel graded up to ⅜ in. in size is usually satisfactory for this type of product. Of course, the amount of sand and pea gravel which can be used will be governed by the plasticity required to place the concrete with a given plant practice in the forms.

"Regarding reinforcement, expanded metal, wire mesh or reinforcing rods may be used. In no case should stampings, poultry netting and so on be used. I've seen this done and it has led to tragic results. If you're using expanded metal, which seems quite popular at the present time, the openings should be at least 2 sq. in. in area and not less than 1 in. in the least dimension so that the concrete can be easily worked around the metal. The maximum spacing of reinforcing members should be not more than 4 in. on centers. If mesh is used, it should be lapped two openings and tied with annealed wire. Rods, when used, should be lapped 30 times their diameter and tied.

"Now about mixing. Only machine mixing should be used. You already have that part of your equipment. You already have a vibrator which you use in making joists. I'd suggest vibrated concrete for the vaults you intend to make. Certainly it's going to save labor in placing the concrete and will enable you to get a stiffer mixture, which again will be an economy measure. Vibration, of course, causes the mixture to flow around the reinforcement and completely fill all the spaces in the mold, and at the same time produces an attractive finish without additional labor.

"When the box is cast in an inverted mold, there is sometimes a tendency for the sides to settle and pull away from the bottom of the vault. You can prevent this if you will allow the sides of the vault to settle a short time before placing the bottom, which, in reality, is the top of your form. After the

A well-made, good-looking product is a distinct sales help.

vault is set up, you ought to go over the exposed surfaces very carefully with a trowel to prevent checking. Your cover can be formed with a wood float. But by all means do not use a steel trowel on the concrete until it has set 30 to 45 min. or until the water sheen has disappeared.

"Now for curing. There is no substitute for that. The product should be kept moist for at least 7 days and any time in addition to this is insurance against the possibility of leakage and makes for complete watertightness. If the weather happens to be hot and dry when you are making your vaults and you have to store them outside, cover them with burlap and keep them moist at least 14 days. If you make them in winter, store them inside at a temperature of at least 50 deg. F. for 5 days.

"Most of the progressive manufacturers nowadays are painting their vaults after they are finished. They're using a cement paint. The vault should be damp when this paint is applied and all traces of form oil should be removed previous to the application of the paint.

"There are various types of vaults. If you'd like the names of mold manufacturers I'd be very happy to give you ten or twelve of them. The air-seal type of vault requires no application of a sealing material. Other types do require sealing, a job which necessitates much care. If a cement-mortar seal is used, it should be mixed up 2 or 3 hr. before it is needed and then remixed without adding water before it is applied. The bond can be more effective, if the surfaces to be sealed are dampened and brushed with a creamy mixture of cement and water before the mortar is applied. There are a number of patented sealing compounds on the market, but before I'd adopt one for my own use I'd like to try it out on a vault that could be easily inspected several times over a period of months.

"I said before that you'd have to place the vault. In some cases it has been possible for vault manufacturers to work out agreements with cemetery superintendents to do the setting and sealing. Thus, in a rush season your obligation is ended when the vault is delivered to the grave. That is, if you are certain that your superintendent is going to do the workmanlike job that is so necessary.

"Yes, I think the vault business should be a good one in your territory. I know of no other concrete-vault manufacturer anywhere near you and I am certain that with the quality product you're bound to turn out, you will have a lot of success with them. And it won't cost you a fortune to go into this business. Your success is going to depend on just three things: (1) a high-quality product; (2) the type of arrangement you are going to be able to make with the funeral director who will do the direct selling, and (3) the friendly feeling you are able to build up on the part of cemetery officials.

Legislation (from page 55)

in the last four years, not even excluding the N.R.A. It will call for a control in Washington of the most remote phases of all industry, and the board is given what amounts to a roving authority to do as it pleases in fixing employment standards in all their phases. Characteristic of the confusion which permeates the bill is a provision in Sec. 10 that board hearings 'shall be held at a point as near the principal place of business of the employer involved as is practicable'. This would seem to anticipate that the board will make a separate ruling on wages and hours for each company in each industry, and yet the whole substance of the bill, including the Green amendments, requires a vertical determination for each industry of wage and hours standards. The chairman of the Labor Committee, however, naïvely proclaims that Sec. 10 will remove the criticism that employers and employees will have to come to Washington to have a voice in the rulings of the board.

The Wagner - Steagal Low - Cost Housing Act, to provide safe and sanitary dwellings for low-income rural and urban families, incidentally to relieve unemployment, is expected to be applicable immediately to 33 states. The law creates the U. S. Housing Authority under the supervision of the Secretary of the Interior. It will be managed by an Administrator at $10,000 per year. The U. S. immediately furnishes a capital of $1,000,000. The housing may be available only for families with net incomes not exceeding five or six times the rental charge for the property. The Authority may make loans to public housing agencies to assist in developing low-rent housing or slum-clearance projects, the loans not to run over 60 years, bearing interest at the going federal rate, plus one-half of 1 per cent. and not to be larger than 90 per cent. of the acquisition or development cost of the project. The Authority may make annual contributions to assist in projects, subject to certain conditions, and provided that the state or local interests contribute at least 20 per cent.

Capital grants are authorized, limited to 25 per cent. of the development or acquisition cost. Grants are limited to $30,000,000 for the next three years. The President also may make additional grants for labor payments from unemployment relief funds, not to exceed 15 per cent. of the cost of the housing project. State or local interests must contribute 25 per cent. No state may obtain more than 10 per cent. of the funds provided in the Act. The average dwelling unit cost may not exceed $5,000, or $1,250 per room. An appropriation of $25,000,000 is authorized for the fiscal year ending June 30, 1938. The President also may allocate funds of the Federal Emergency Administration of Public Works. The Authority is authorized to issue a total of $500,000,000 of securities, maturing in 60 years, guaranteed by the U. S., and bearing interest not to exceed 4 per cent.

Despite the President's opposition, expressed in a letter to the Vice-President, stating that the Tydings-Miller Price Maintenance bill would weaken anti-trust statutes, and interfere with his policy of strict enforcement, Senator Tydings secured the passage of the bill by reason of the Congressional rebellion, and the eagerness to curtail the influence of chain stores. The act amends the Sherman anti-trust laws by permitting agreements in states having fair-trade laws between manufacturers, distributors and retailers to fix resale prices on branded or trade-marked goods. The immediate effect of the law is that it is expected to force the Federal Trade Commission to abandon all its price-maintenance prosecutions under the Robinson-Patman and other acts. It is also expected to make almost impossible the control of monopolies and trusts. There are those in Washington, who should know, who believe that the act will cause abandonment, or weakening, of the cases against the Cement Institute, the Cast-Iron Soil-Pipe Assn., and even perhaps the foray against the Aluminum Co. of America. The idea is that it would be even legal nonsense to try to smash a trust, if it can legally fix prices. It is anticipated that many industries which have never dreamed of branded wares will now trade-mark them.

Wtih price-fixing legal, the trade organization has become necessary to inform members of prices, to keep a close check to make certain that members do not undersell; in short, to maintain uniformity of prices and trade practices.

New plant of Mixed Concrete Corp. with aggregate-truck hopper and elevator at the right.

Columbus Concrete Producer Adds Second Batching Plant

BY W. E. TRAUFFER

IN order to expand its productive capacity and at the same time to provide faster and more economical service to a larger area, the Mixed Concrete Corp., Columbus, O., on May 1 of this year put into operation its second batching plant. This plant is located at 312 West Gay St., about ½ mi. west of downtown Columbus. It has a capacity of over 30 cu. yd. per hr. During 90 per cent. of the time it can be operated by one man, as only when cement or aggregate is being loaded is another man needed.

The Mixed Concrete Corp. was formed in 1934 to take over the ready-mixed-concrete business of the Permanent Concrete Products Co. The original handling and batching equipment in what is now known as Plant No. 1 was left in the concrete-products plant which belongs to that company and from which space is rented. This operation is on West Bartman St., about 3 mi. south of downtown Columbus.

The truck-mixers are first loaded with sand and gravel at the Welch Ave. producing plant of the American Aggregates Corp., ¼ mi. away. The cement and water are added at Plant No. 1, which has a capacity of 25 cu. yd. per hr. Sand and gravel for the new No. 2 batching plant are hauled by trucks from the Welch Ave. plant. The new batching plant is so located that a low trucking rate for sand and gravel is obtained and very little of the concrete is delivered back in the direction from which the aggregates were hauled.

In 1934 a fleet of four 1½-cu. yd. Jaeger truck-mixers was operated. Up to the time the new plant was built this fleet had been expanded at intervals to 10 units. Another machine has just been added. All these are 2½-cu. yd. Jaeger truck-mixers the old 1½-cu. yd. units having been traded in or sold. The newest mixer is mounted on a General Motors truck and has a new type of two-speed power take-off recently developed by Jaeger. The other mixers are mount-

One of the older of the 11 truck-mixers being loaded.

A recent addition to the fleet of truck-mixers.

ed on White chassis and are operated by Hercules gasoline engines.

According to C. E. Haines, secretary, treasurer and general manager of the company, the larger truck-mixers are more practical and economical under the conditions existing in this territory. Only a very small percentage of the company's orders is for quantities of less than 2½-cu. yd. The lower per-cubic-yard fuel and labor cost of these large units on the larger orders more than compensates for the extra cost of delivering the few small orders.

At plant No. 2 sand and gravel are discharged from trucks standing on a ramp into an 8-ft.-square steel hopper. These materials are discharged through a lever-operated sliding gate into a 55-ft. belt-bucket elevator. A

Garage and office of the company.

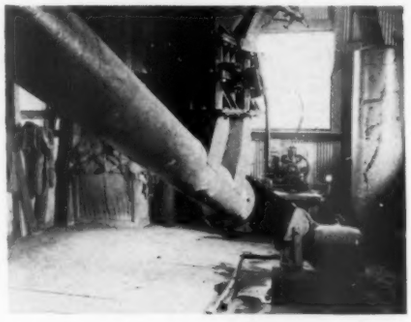
revolving turnhead, moved by cable from a windlass on the batching floor, controls the discharge of the aggregates into any of the four 37½-ton compartments of the steel aggregate bin.

Cement is received in bulk in special hopper cars from which it is discharged through a tube into a 10-in. by 15-ft. screw-conveyor under the track. From this conveyor the cement goes to a 55-ft. fully-inclosed bucket-elevator. A gate controls the discharge of the cement into either of the two 300-bbl. compartments of the steel cement-storage bin. Compressed air is used to insure the free discharge of the cement from the bin compartments.

Two Fuller Co. rotary valves control the discharge of the cement into a 9-in. by 20-ft. inclined screw feeding the cement-weighing batcher, which has a capacity of 3,000 lb. and is equipped with a 2-beam Buffalo scale and a Foundry Supplies Mfg. Co. electric vibrator which insures complete discharge of its contents. Sand and gravel are discharged through four clam-shell gates into the aggregate-weighing batcher, which has a capacity of 3 cu. yd. and has a 4-beam Buffalo scale. Both batchers have under- and over-indicating dials and discharge direct through a spout into the truck-mixers under the plant.

The mixing water is measured by a selective-quantity Auto Stop Trident water meter manufactured by the Neptune Meter Co. This meter can be set to deliver any selected quantity of water from the city water mains. The meter dial is 11 in. in diameter, providing desirable visibility, and is calibrated in gallons. Red and black hands moving clockwise enable the operator to ascertain with a very close degree of accuracy at any time the amount of water measured out. One complete revolution of the black hand indicates 10 gal., and one complete revolution of the red hand indicates 500 gal. Preceding the meter is a special Jenkins valve connected to the Auto Stop mechanism in the register of the meter, which automatically closes this valve when the selected quantity has passed through the meter. The register is also provided with a totaling register, from which can be determined by inspectors for accounting the total quantity of water that has passed through the meter in any given period of time, such as one day, one week, one month, etc. The totaling register is not affected by the indicating hands returning to zero after each selected quantity has passed through for the various batches. A fine-mesh Neptune Trident sediment trap is located on the inlet side to protect the accuracy and satisfactory operation of the units, which otherwise could be impaired by foreign matter, such as pipe scale, dirt, etc. The entire register mechanism is inclosed in a dust-proof and weatherproof metal housing.

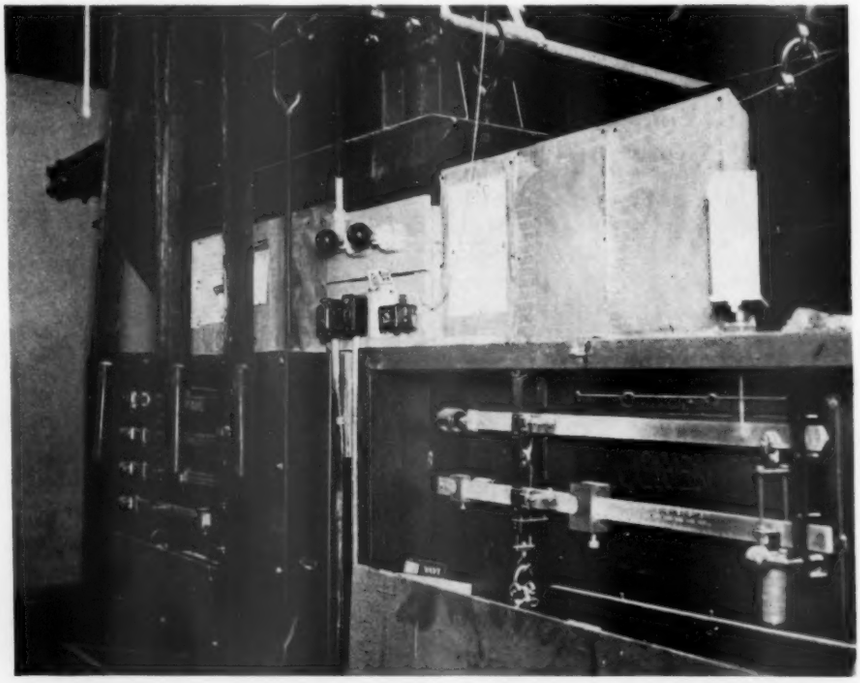
The water is ordinarily discharged into the truck mixer drum, but it can be discharged through another line into



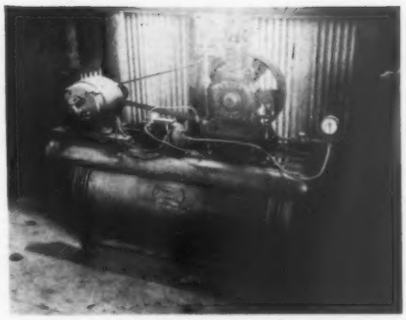
Two rotary cement valves with screw feeder to batcher.

the measuring tank, with which each mixer is equipped.

The plant was designed and erected by the Erie Steel Construction Co., which also supplied the cement and aggregate bins and the weighing batchers. The Columbus Conveyor Co. furnished the truck hopper, the bucket-elevators and the screw-conveyors. Master geared-head weatherproof motors and chains drive all the equipment. The cement elevator is driven by a 10-hp. motor and the car-unloading screw-conveyor is driven from the elevator tail pulley. The cement-batcher feed-screw is driven by a 5-hp. motor and the aggregate



Aggregate weighing batcher and, at right, the cement batcher. Four- and two-beam scales with mixing charts above.



Compressor which furnishes air for agitating cement in the bins.

elevator by a 20-hp. motor. Air for cement agitation is supplied by a Brunner Mfg. Co. compressor mounted on a horizontal tank.

The trucks on which the mixers are mounted are owned by W. E. Anderson & Son, who also control the Anderson Haulage Co., which does much of the sand-and-gravel and crushed-stone hauling for producers in the Columbus area. W. E. Anderson is president of the Mixed Concrete Corp. and his son, Ralph Anderson, is vice-president. Although having the same officers, these companies are distinctly separate enterprises. All the concrete hauling is paid for on a yardage basis and a zone system. The area served is divided into 1-mi. circular concentric zones surrounding the center of the city at Broad and High Streets.

Whenever possible the concrete is sold on a strength basis, using the water-cement ratio method of design. Some users of concrete still specify arbitrary mixes, but their number is decreasing as they become informed of the disadvantages of this system. The proportioning of any desired mixture at a moment's notice is made possible by the use of charts for strengths of from 1,500 to 4,000 lb. On these charts are given the quantities for the three sizes of gravel, ½-, 1-, and 1½-in., and for sand of various moisture contents. These charts are placed above the batcher scales. The levers operating the bin and batcher gates, the buttons controlling the cement screw-feeder motor and the electric vibrator, the water meter, the air valve, and all the other controls are grouped on the batching floor convenient to the operator.

Water measuring system with trap at right; valve in center is interlocked with meter at left.

According to Mr. Haines, the prices for concrete have been stable at a reasonable level. The base price for 3,000-lb. or 1:2:4 concrete is $7.50 per cu. yd. and up, depending on the distance it must be hauled. On large orders a deduction of $1.00 per cu. yd. is made.

All the orders for concrete are cleared through the company's office at 560 Harmon Ave., about midway between the two plants. From this office the orders are telephoned to the plants. All the bills are made out in triplicate; one copy goes to the office for record, one to the customer with the load, and the third to the haulage company, which bills the concrete company for its work.

Much of the concrete being produced by this company and other concrete producers in Columbus is being used in connection with a local W.P.A. sidewalk-building program. A recent survey by the W.P.A. showed a potential market for 2,500,000 sq. ft. of sidewalk, of which about 750,000 sq. ft. is expected to be completed this year.

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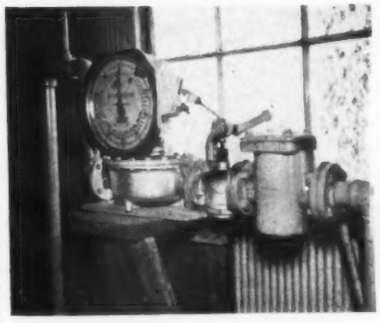

Neptune Meter, Auto-Stop Type, installed on city main for measuring mixing water at batching plant of the Mixed Concrete Corp.

The Neptune Trident Liquid Meter . . . the modern method of accounting for liquids in processing . . . is becoming the standard equipment in concrete plants for batching operations.

It solves the problem of fast, accurate measurement of mixing water, insuring proper proportioning when strict specifications must be met.

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- ☐ Conveyors, Apron
- ☐ Conveyors, Belt
- ☐ Conveyors, Pneumatic
- ☐ Conveyors, Screw
- ☐ Conveyors, Skip
- ☐ Coolers
- ☐ Couplings, Flexible
- ☐ Couplings, Hose
- ☐ Cranes, Locomotive
- ☐ Cranes, Overhead Traveling
- ☐ Cranes, Truck
- ☐ Crushers, Cone
- ☐ Crushers, Disc
- ☐ Crushers, Gyratory
- ☐ Crushers, Hammer
- ☐ Crushers, Jaw
- ☐ Crushers, Ring
- ☐ Crushers, Roll
- ☐ Crushers, Rotary
- ☐ Cutter Heads, Dredging
- ☐ Derricks
- ☐ Draglines, Cableway
- ☐ Draglines, Revolving Boom
- ☐ Dredges, Dipper
- ☐ Dredges, Hydraulic
- ☐ Dredges, Ladder
- ☐ Drill Sharpening Machinery
- ☐ Drills, blast hole
- ☐ Drills, Diamond Core
- ☐ Drills, Hand Hammer
- ☐ Dryers, Rotary
- ☐ Dryers, Sand and Gravel
- ☐ Dust Collecting Systems
- ☐ Dynamite
- ☐ Elevators, Bucket
- ☐ Engines, Diesel
- ☐ Engines, Gas
- ☐ Engines, Gasoline
- ☐ Engines, Hoisting
- ☐ Engines, Oil
- ☐ Feeders
- ☐ Filters, Air
- ☐ Filters, Oil
- ☐ Fire Brick
- ☐ Flanges, Pipe
- ☐ Frogs and Switches
- ☐ Fuses, Blasting
- ☐ Gears
- ☐ Goggles
- ☐ Governors
- ☐ Grinding Balls
- ☐ Grizzlies
- ☐ Guns, Hydraulic
- ☐ Hoists, Air
- ☐ Hoists, Derrick
- ☐ Hoists, Drum
- ☐ Hoists, Motor Truck Body
- ☐ Hoists, Skip
- ☐ Hose, Air, Stream, Water
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- ☐ Nozzles, Spray
- ☐ Nozzles, Dust Settling
- ☐ Nozzles, Suction Hose
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- ☐ Poidometers
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- ☐ Pulverizers, Hammer
- ☐ Pulverizers, Ring
- ☐ Pulverizers, Rod
- ☐ Pulverizers, Roll
- ☐ Pumps, Centrifugal
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- ☐ Screens, Shaking
- ☐ Screens, Vibrating
- ☐ Separators, Air
- ☐ Separators, Dry Centrifugal
- ☐ Separators, Magnetic
- ☐ Shovels, Gasoline
- ☐ Shovels, Steam
- ☐ Skips
- ☐ Sleeves, Dredge
- ☐ Slugs and Nuggets, Grinding
- ☐ Speed Reducers and Gears
- ☐ Spray Nozzles
- ☐ Sprays, Paint
- ☐ Sprockets
- ☐ Steel, Tool
- ☐ Stokers
- ☐ Switches, Track
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- ☐ Tanks, Sand Settling
- ☐ Tanks, Wood
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- ☐ Track Shifters
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- ☐ Tramways, Aerial
- ☐ Trippers, Belt
- ☐ Trippers, Tramway
- ☐ Unloaders
- ☐ Valves, Pump
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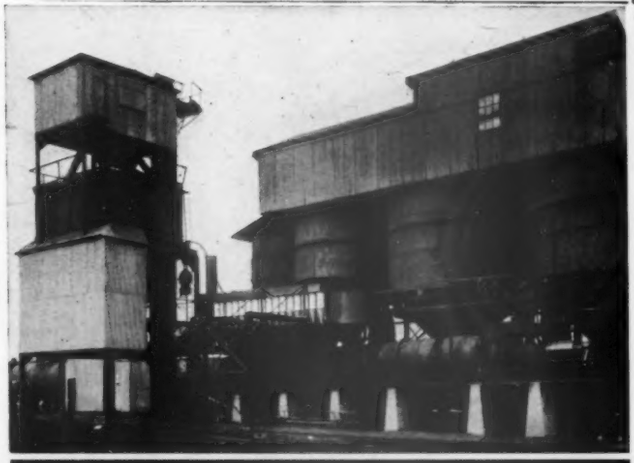

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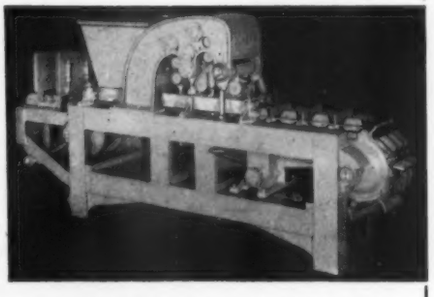

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Aggressive producers like Riverside Sand & Gravel Co., Thiensville, Wis.—Consolidated Rock Products Co., Brooksville, Fla.—W. P. Rose, Goldsboro, N. C.—Consolidated Quarries of Georgia—Georgia Mineral Products Co., Tate, Ga.—are converting their surplus sand into profits. Aggregate made into these modern units sells up to $12.00 per ton.

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D. L. CARPENTER

President, Ross Island Sand & Gravel Co. Portland, Ore.

MEN • OF • THE • INDUSTRY

After having reorganized the Beaver Portland Cement Co. in 1919 Mr. Carpenter became interested in the possibilities of the sand-and-gravel business and when the Ross Island Sand & Gravel Co. was formed in 1926 he acquired a large interest in the concern, becoming its president. Early this year, he resigned as president and general manager of the cement company to devote his full time to the operation and management of the aggregates concern. The Ross Island company is Portland's leading producer, having an output of about 400,000 tons annually. The company, under Mr. Carpenter's direction, has also been responsible for improving the quality of the aggregates produced and used in the Portland area.

Another Gravel-Plant Owner Operates Pool

Charles Mason of Ney, O., 50 miles west of Toledo, has a profitable gravel pit. In fact, his pit is profitable at both the operating end and the worked-out, water-filled end. The older part is practically out of sight of the present operations. Here Mr. Mason has beautified by extensive landscaping and has installed accommodations for swimmers, including bath house, rafts, diving towers and other equipment. The clear water, coupled with the fact that a life guard is always on duty, has made it a very enticing place for bathers. An average of 500 to 700 people per day go in during the hot months. At 15c. and 20c. a head, this has really developed into a nice side line.

Mr. Mason at the controls of the drag-line hoist.

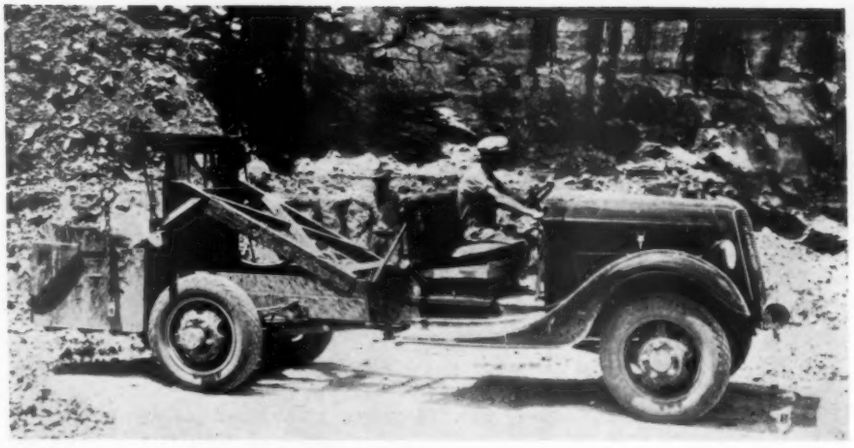
Mr. Mason has worked this pit since 1923, with a Novo drag-line hoist, powered by a 40-hp. Novo industrial engine. The hoist is hooked up as a slackline cableway. The mast at the stock-pile is 60 ft. high. The span is 350 ft. and at present the gravel is being dug 30 ft. below the surface. A ⅝ cu. yd. bucket is used.

Contractors and the Ohio highway department take Mr. Mason's entire production.

Automatic Skips Lower Cost in These Quarries

The Corydon Crushed Stone Co., Corydon, Ind., has increased production and reduced costs through the use of automatic skips in the quarries, according to Joe E. Stiner, secretary of the company. The company operates quarries and plants at Elizabeth, Ramsey and Crandall, Ind., in addition to the one at Corydon. Automatic skips are in use at all four operations.

Ford V-8 trucks are used in connection with the skips. The equipment at each quarry consists of one Ford V-8 truck fitted with a hoisting rig and four skips. Measuring 36 in. by 36 in. by 20 in., the skips have a capacity of 1¼ cu yd. each. The skips are loaded by hand and transported across the quarry and dumped one at a time. A truck can transport and dump one skip a minute.



One of the trucks about to haul away a loaded skip.

"We started out years ago with one quarry operated by mules and carts and later trucks. We had from 30 to 40 men at work and it was a mighty big day when we got out 200 cu. yd. of stone," says Mr. Stiner.

"We heard about the automatic skip and drove 170 miles to see one work. It was well worth the trip for this equipment is just the thing for an operation which does not justify a big investment. Our equipment cost us about $1,600 per quarry.

"A crew of 15 men can easily get out 400 cu. yd. of stone a day with one of these outfits. The saving in labor runs from $22 to $27 per day for each quarry."

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Personal Mention

IRWIN F. BINGHAM, assistant professor of petroleum engineering at the University of Oklahoma, has resigned his position following a two-year leave of absence. Mr. Bingham for the last two years has been working on a research project for the Universal Atlas Cement Co. at Waco, Tex., and has accepted a permanent position with that firm.

KENNETH BRAMMER and PAUL BANKS, phosphate miners, have sent a carload of Wyoming's phosphate to T.V.A. laboratories at Sheffield, Ala., for testing and processing as the latest step in Wyoming's official move to obtain funds to develop the huge phosphate desposits in the Cokeville, Wyo., area. The test is being made at the instigation of Dr. A. G. Crane, president of the University of Wyoming, who recently represented the state at a tristate meeting with T.V.A. officials at Muscle Shoals.

ARCH KAVANAUGH has opened a lime-manufacturing plant south of Cassville, Mo., with a capacity of 75 tons per day.

ROBERT GWINN, Danville, Ky., quarryman and road contractor, recently purchased the A. J. Colyer quarry at Somerset, Ky. Besides the quarrying and crushing equipment, 12 trucks were included in the purchase.

DWIGHT W. DOSS, Fresno, Cal., contractor and owner of the Central Valley Cement Products Co., has gone into the production of concrete bricks following the completion of a $25,000 Dunbrik plant.

RUSSELL SALTER, mill superintendent for the Western Graphite Co., Lake Hughes, Cal., has gone to the Philippines as mill superintendent for Atok Gold Mining Co. at Baguio.

WILLIAM R. CHEDSEY, after 21 years of service as professor of mining at the School of Mineral Industries at Pennsylvania State College, State College, Pa., has resigned to become director of the Missouri School of Mines, Rolla, Mo.

M. I. DORFAN, former manager of the Blaw Knox dust division, has been reëmployed by the Pangborn Corp. to act as general field representative under the title of dust-control specialist. To facilitate speed of service to the entire dust field, Mr. Dorfan will contact interested prospects with dust problems from the Pangborn offices in the Chamber of Commerce Bldg., Pittsburgh, Pa.

GEORGE H. REITER has been made a vice-president of the Universal Atlas Cement Co., Chicago, Ill. Other new appointments include W. L. GREENLY and JAMES D. SCOVEL, assistants to vice-president, Chicago; L. B. THOMAS, district sales manager, St. Louis; W. R. HECKENDORN, sales manager, New York; W. A. MCINTYRE, sales manager, Philadelphia; and FLOYD L. MABIE, manager Atlas White bureau, New York.

D. A. CHEYETTE, formerly in charge of the Chicago offiice of the Traylor Eng. & Mfg. Co., is now associated with the Nordberg Mfg. Co. He will represent Nordberg in the sale of crushers, screens and classifiers and for the present is working out of the Milwaukee office.

O. L. HALL, Sheboygan, Wis., banker, has acquired control of the Elkhart-Moraine Sand & Gravel Co. of Elkhart Lake, Wis., well-known operation in Wisconsin.

MAX HOFMANN has been appointed export sales manager of the Waukesha Motor Co., succeeding M. E. Nicklin.

CHAUNCEY WILLIAMS has been appointed to direct plant production by the Four Wheel Drive Auto Co. of Clintonville, Wis.

GUY LAWRENCE is superintendent of the new crushed-stone plant being operated at Marble City, Okla., by the Dunlap Co., Oklahoma City.

J. H. HILLMAN, JR., has been elected president of the Green Bag Cement Co. of Pennsylvania, Pittsburgh, Pa.

HOWE Scales of every type for the rock products industry. Railway track, motor truck, batching, etc.

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Delays in weighing truck loads; "over" or "under" weighing of trucks or car loads; guessing at weights—all cost you money and lose for you your plant's most important asset, customer goodwill.

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The Weightograph attaches to your present scale. It gives you fully 75 per cent faster weighing than a straight beam scale. No handling of weights and poises. No squinting at small beam figures. The exact load figures show on the ground glass screen of the Weightograph — large and clear, easy to read at a glance from wherever you stand.

One large producer declares that he sold 250 more tons of sand and gravel through the time saved by Weightograph weighing. It will save for you, too! Write today for information and prices, to The Howe Scale Company, Dept. P-9, Rutland, Vermont.

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H. L. Block of Davenport, Ia., has moved to Sterling, Ill., where he has gone into the manufacture of concrete units under the firm name of the Sterling Concrete Products Co.

Howard S. Sayre has been named manager of the Chicago office of Fuller Co., Catasauqua, Pa. Mr. Sayre has been in the employ of the company for a number of years doing engineering and sales work at the home office.

Antonio Lanese, 69, president and general manager of the Newburgh Sand & Gravel Co., Cleveland, O., died Aug. 1 at a Cleveland hospital. He was a native of Italy and had lived in Cleveland since 1893.

J. B. Orr, director of the Keystone Portland Cement Co., died July 17 at his summer home in Great Barrington, Mass. An attorney, Mr. Orr retired from the bar in 1928 and made his residence in Pittsburgh.

Charles P. Woodworth, 56, vice-president of the Weber Chimney Co., Chicago, died suddenly on August 12. Mr. Woodworth had been vice-president since 1909, prior to that time having been Sales Manager. He had been in poor health for a number of years and had not been active in business since 1934.

Clifford A. Owens, 54, president of seven firms producing excavating machinery and tractors, died recently in Marion, O., of uremic poisoning. He served on the national code authority for the shovel, drag-line and crane industries during the National Recovery Administration, and headed the Osgood Co., Commercial Steel Castings Co., Alloy Cast Steel Co., General Excavator Co., Hercules Co., Engineering Equipment Co. and Power Manufacturing Co.

Richard Robertson, 30, was fatally injured recently in the pit of the Fordyce Gravel Co., near Calellan, Tex. He was buried under an avalanche of sand when a bin structure collapsed.

Alexander G. McKenna, 72, chairman of the board of the Pomona Pump Co., Pomona, Cal., died July 29, at a Pasadena hospital. Death followed a seven weeks' illness.

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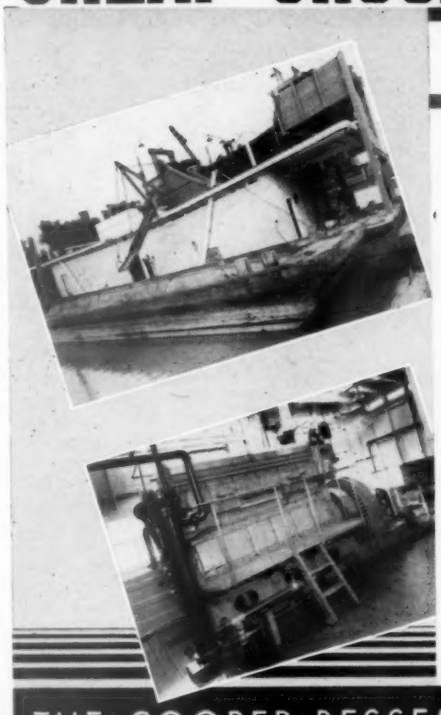

Kanawha Sand Company, at Parkersburg, W. Va., obtain a lot of convenient, reliable and yet mighty cheap power for their crusher and screens. Mr. C. Z. Ruth, President, and Mr. A. A. Barringer, Engineer, selected a Cooper-Bessemer, 325 H. P., Diesel Electric Set as their source of low-cost power...*and profit*! Investigate Cooper-Bessemer Diesel and Gas Engines...economy champions!

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Traffic News Digest

Legislation

Train Limit.—On July 26 the Senate passed the train-limit control bill S. 69 limiting the length of trains to 70 cars. No hearings were held by the Senate Interstate Commerce Committee on this legislation but there were hearings on a similar bill in 1935. The bill was favorably reported by the Senate committee on interstate commerce and received some debate on the floor of the Senate. It was defended as a safety measure but also was opposed for the same reason, the opponents claiming that limiting the number of cars to 70 would increase the number of trains which would be more hazardous. Those favoring the bill admitted that it would increase the cost of hauling freight. The bill was favored by railroad-labor executives and was opposed by the Farmers' National Grain Dealers' Assn. and by the Industrial Traffic League. After being passed by the Senate the bill was sent to the House where it was referred to the House committee on Interstate and Foreign Commerce. At a meeting held August 16 this committee voted to hold hearings on the bill next January. As passed by the Senate the bill does not become effective until July 31, 1938.

Through Routes.—Senate bill No. 1,261, amending Par. 3 and 4 of Sec. 15 of Part 1 of the Interstate Commerce Act to give the commission greater jurisdiction over through routes has been passed by the Senate without a hearing before the Interstate Commerce Committee. Senator Dietrich, in opposing the bill, said in part:

"The bill before us seeks to give the Interstate Commerce Commission the right to control routing over long and short hauls. The chairman of the committee says it gives the shipper that privilege. Possibly it does. There is one thing it does; it absolutely denies every right a railroad has to operate its own property, to make its own contracts with shippers, and to enjoy the advantage of the investment it has made in its effort to accommodate the public.

"The matter of establishing long hauls has been the subject of a long fight in this country. It has meant millions of dollars of investment, and those long routes were established for the purpose of accommodating and facilitating the transportation of commodities for the benefit of the citizens of this country, and the railroads which established those routes should have some right to the enjoyment of the property they caused to be created. This bill absolutely denies them that right. The initial railroad that enters into the contract with the shipper, and whose contract is binding, and which, if the property is damaged or delayed, must respond in damages to the shipper, can not control the shipment of the commodity. The initial road can receive it, take the responsibility, and perhaps have it diverted, not over a short haul, but have it diverted over a long haul, to its destination. That is manifestly unjust. It is manifestly wrong."

The house committee on Interstate and Foreign Commerce voted to hold a hearing on the bill next January.

Governmental Reorganization.—Commissioner Eastman, who was reappointed commissioner by President Roosevelt, in talking before the Senate committee on government organization on August 9 spoke against the enactment of Senate bill 2,700, providing for the transfer of the Interstate Commerce Commission to the executive department of the government. He stated that the commission was essentially an arm of the Congress and that it had few duties which might be classed with the executive or judicial functions of government. He asked that those who wanted the change should make a specfic statement of the ills which they want to cure and how they propose to cure them after a careful analysis of the commission's work and a consultation of those concerned with it. He said that all that is available are the vaguest and most indefinite of glittering generalities.

Chairman Miller of the commission, in a letter to the chairman of the Senate committee, went into some detail as to the possible effects of the proposed legislation which gives the present broad powers to: (1) transfer or retransfer the whole or part of any agency or the functions thereof to the jurisdiction and control of any other agency; or (2) regroup, coördinate, consolidate, reorganize or segregate the whole or any part of any agency or the functions thereof; or (3) abolish the whole or any part of any agency or the functions thereof; and (4) prescribe the name and functions of any agency affected by any such executive of it and the title, power and duties of the executive head. Among a large number of objections to this legislation, he cites the fact that the commission has operated on a non-partisan basis with employees having been chosen without relation to their political affiliation and that under the proposed law the employees might be chosen by another agency which did not have a non-partisan and non-political character.

In the testimony before the Government Reorganization Committee, R. G. Fullbright, representing the Industrial Traffic League which is unalterably opposed to the bill, stated, "Let this bill become a law and within 10 years you will find the commission shot through with politics and pursuing a policy of political log-rolling rather than of expert non-partisan administration."

Elmer A. Smith and E. S. Brashers appeared on behalf of the Assn. of Practitioners before the Interstate Commerce Commission in opposition to the bill, as did C. A. Miller, general council of the American Short Line Railroad Assn. Mr. Miller listed the following five objections to the proposed legislation:

"1. It makes possible executive domination of the Interstate Commerce Commission, and would undermine the commission's independence.

"2. It centralizes, without any limitation, too much power in the executive, with that power too indefinitely specified.

"3. It furthers the creation of a government of men and not of laws.

"4. The damage caused by the bill would be far greater than any benefits which would accrue from it.

"5. It violates all precedents, so far as the Interstate Commerce Commission is concerned and establishes a bad precedent for the future."

Opposition to the bill was also voiced by representatives of the New Jersey Industrial Traffic League, the Witchita, Kansas Chamber of Commerce and the National Industrial Traffic League.

The House Committee on government reorganization favorably reported for passage H.R. bill 8,202 without a public hearing.

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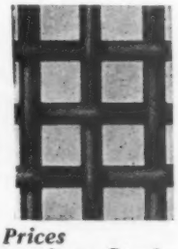

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Recent I. C. C. Decisions

Sand.—Finding the rate on molding sand from Cedar Lake and Millville, N. J., to Elmira, N. Y., on shipments made during September and November 1934 unreasonable to the extent it exceeded $2.40 a ton, the commission has awarded reparation of $63.63 with interest in I. C. C. Docket No. 27,156, Kennedy Valve Mfg. Co. *v.* C. of N. J., *et al.*

In a large number of cases dealing with industrial sand between points in official territory moving prior to July 1, 1935 the commission has found some rates to have been unreasonable and has awarded reparation totaling $4,396.15 with interest. In some cases the rates were not shown to have been unreasonable. The decision in these cases follows very closely the decision in industrial sand cases 1930, 188 I. C. C. 99, 204 I. C. C. 159, 219 I. C. C. 449, and 220 I. C. C. 696. A list of the cases involved will be furnished on request.

Examiners' Reports

Lime.—Examiner George M. Curtis proposes that the commission find the rates on chemical lime from Eagle Mountain, Va., to South Charlestown, W. Va., unreasonable prior to April 3, 1936 to the extent it exceeded $2.20 a net ton car-load, minimum weight 50,000 lb., but reasonable thereafter. The rate prior to April 3, 1936 was $3.02, it having been reduced on that date to $2.20. I. C. C. Docket No. 27,469 Virginia Lime Products Co., Inc. *v.* C. & O. *et al.*

Sand.—Examiner Burton Fuller proposes an award of reparation amounting to $6,527.03 in a number of industrial-sand cases involving movement from Maiden Rock, Wis., to Barberton, O., and between various points in official territory. The complainants entitled to reparation are S. Cheney & Son., Atlantic Foundry Co., Pratt & Letchworth Co., Inc., Gillinder Bros., Inc., Columbia Malleable Castings Corp., General Fire Extinguisher Co., and Wilcox, Crittenden & Co., Inc. A list of the cases involved will be furnished on request.

New Complaints Filed

Bituminized Aggregate.—Alleging unreasonable charges on asphalt-coated stone from St. Louis, Mo., to Effingham, Ill., on account of the carrier furnishing a car of 140,000-lb. capacity instead of the 60,000-lb. capacity ordered, the establishment of minimum weights, rates and reparation is sought in I. C. C. Docket No. 27,816, Granite Bituminous Paving Co., St. Louis, Mo. *v.* P. R. R. *et al.* Filed by R. M. Godfrey, 517 Boatmen's Bank Bldg., St. Louis, Mo.

Sand.—Reparation is sought on an alleged violation of Sec. 1 in connection with the movement of molding sand from Evansville, N. J., to Waterbury, Conn., in a complaint filed by Edgar O. Anderson and L. V. Brandt, 2218 S. Michigan Ave., Chicago, in I. C. C. Docket No. 27,802, Waterbury Foundry Co., Waterbury, Conn. *v.* New Haven *et al.*

In three complaints filed by Wm. H. Neely, attorney, 902 Mechanics' Trust Bldg., Harrisburg, Pa., violation of Sec. 1 is alleged and reparation is sought in connection with the movement of industrial sand. In I. C. C. Docket No. 27,803, Floyd-Wells Co., Royersford, Pa. *v.* N. Y. C. *et al*, the rate from Selkirk, N. Y., to Royersford. Pa., is attacked. In sub No. 1 to the same docket, Berks Foundry & Mfg. Co., Hamburg, Pa. *v.* N. Y. C. *et al*, the movement is from Selkirk to Hamburg and in sub No. 2, Wincroft Stove Works, Middletown, Pa. *v.* N. Y. C. *et al*, the movement is from Selkirk to Middletown.

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Foreign Developments

Solubility of Lime in Water, Sugar Solutions

The solubility of $Ca(OH)_2$, as customarily given by means of the amount of CaO found in 100 g. of solution at 0, 20, 40, 60 and 80 deg. C. is stated as 136, 127, 110, 89 and 72 mg., thus decreasing with increasing temperature, like the pH value (12.61 to 12.32). In the presence of NaOH the solubility of $Ca(OH)_2$ is less, and at 20 C. reaches the following values:

87 mg.	0.02 n. NaOH
61 mg.	0.05 n. NaOH
30 mg.	0.1 n. NaOH
14 mg.	0.2 n. NaOH
6 mg.	0.5 n. NaOH

With increasing sugar content the lime solubility of hydrous solutions of course increases. In 100 cu. cm. of a 30 per cent. sugar solution, *e.g.*, up to 7 g. CaO can be dissolved at 20 deg. This lime solubility also decreases with increasing temperature. The pH value is somewhat less than in pure water, but does not depend in appreciable manner on the amount of the sugar in solution. For example, the pH value remains unchanged at 12.6 when the lime: sugar ratio increases from 1.03 to 1.32, the sugar content of the fluid increasing at the same time from 1.5 to 24 g. per 100 cu. cm.—*Zement* 26:409, June 24, 1937, from *Bull. int. de l'Academie polonaise*, Ser. A. 1935, p. 586.

Studies of Magnesia in Portland Cement

In an investigation of the effect of magnesia on the preparation (Part III of an investigation under the general title of the magnesia in Portland cement) four raw mixtures were prepared from (A) $2CaCO_3+1Al_2O_3+1\ Fe_2O_3+1$ MgO, (B) $4\ CaCO_3+1\ Al_2O_3+1\ Fe_2O_3+1$ MgO, (C) $4\ CaCO_3+1\ Al_2O_3+1\ Fe_2O_3+2$ MgO, and (D) $(4+x)\ CaCO_3+1\ Al_2O_3+1\ Fe_2O_3+(2+y)$MgO. These mixtures were heated in an electric resistance furnace at various temperatures, 800, 1,000 1,200 and 1,400 deg. C., for two hours. The free lime was determined by Lerch and Bogue's method and the free magnesia by the author's extraction method, using the 5 per cent. solution of acetic acid in methyl alcohol. The soluble part was determined by the use of dilute HCl. From the observations, the author concludes:

(1) In (A) the chemical reaction of the CaO, Al_2O_3, Fe_2O_3 and MgO is $2\ CaO+Al_2O_3+Fe_2O_3+MgO \rightarrow \frac{1}{2}\{4CaO.Al_2O_3.Fe_2O_3+MgO$ $(Al.Fe)_2O_3+MgO$.

(2) In (B) and (C) some $MgO(Al.Fe)_2O_3$ was found in the intermediate product at 1,200 deg. C. The MgO of $MgO(Al.Fe)_2O_3$ was replaced by CaO as the temperature rose. $4CaO.Al_2O_3.Fe_2O_3$ was formed at 1,400 deg. C. and the MgO existed as a free MgO.

(3) In (D), some $MgO(Al.Fe)_2O_3$ was found as intermediate product at 1,200 deg. C. The $MgO(Al.Fe)_2O_3$ was replaced by CaO as the temperature rose. 4 $CaO.Al_2O_3.Fe_2O_3$ was formed at 1,400 deg. C. and the MgO and excess CaO existed as free state in the clinker.

In an accompanying study on the effect of magnesia on the preparation of $3CaO.Al_2O_3$ (Part IV of the same general investigation), three raw mixtures were prepared of (E) $1\ Al_2O_3+1$ MgO, (F) $(3-x)CaCO_3+1\ Al_2O_3+1$ MgO, and (G) $(3+y)CaCo_3+1\ Al_2O_3+1$ MgO. These were heated in an electric resistance furnace at various temperatures, 800, 1,000, 1,200 and 1,400 deg. C. for two hours. Free lime and free magnesia and the soluble part were determined as in the foregoing instance. The conclusions from these observations were:

(1) In (E), $Al_2O_3.MgO$ was formed at 1,200 deg. C. The formation of $Al_2O_3.MgO$ increased as the temperature rose.

(2) In (F), the calcium aluminate was formed at 1,200 deg. C. The formation of calcium aluminate and free MgO increased as the temperature rose. The formation of the calcium aluminate was completed at 1,400 deg. C. and the magnesia existed as a free MgO in the clinker.

(3) In (G), the calcium aluminate was formed at 1,200 deg. C. The formation of the calcium aluminate and the free MgO increased as the temperature rose. 3 $CaO.Al_2O_3$ was formed at 1,400 deg. C., and the MgO and excess CaO exised as free state in the clinker.—Yoshiaki Sanada in *Journal of the Society of Chemical Industry, Japan*, 40; 244B-246B, July, 1937.

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Occupational Diseases and the Law

Statute of Limitations

Argonaut Mining Co., Ltd., v. Industrial Accident Commission et al., California District Court of Appeal, Third Appellate District, decided June 23, 1937. This case holds that injuries sustained as the result of occupational diseases are compensable only when the disease culminates in disability, and the statute of limitations does not begin to run against a claim for compensation for disability incurred as the result of an occupational disease until the employee knows, or when by the exercise of due care and diligence he is presumed to know, that he has an occupational disease which has progressed to the extent that he is so disabled that the efficiency of his work is appreciably affected thereby. The employee first noticed in 1933 that he was frequently short of breath; the Court holds that there is substantial evidence that while the employee did know in 1933 that he was afflicted with silicosis from inhaling mineral dust in the mines where he had been employed, there is no evidence that he knew, or by the exercise of due diligence should have known, that the disease had disabled him to the extent that the efficiency of his work was impaired until February 16, 1936, when he abandoned the job. The court also dismisses as without merit a contention that the claim is barred by failure to serve the employer with notice of the hearing within 30 days from the time claimant was first aware of the fact that he was suffering from silicosis, as required by Sec. 15; the company was represented by counsel at the hearing, and no evidence was produced to show that the company was "misled or prejudiced" by failure to serve the notice.

Notice of Hearing

Limited Mutual Compensation Insurance Co. v. Industrial Accident Commission et al., California District Court of Appeal, Third Appellate District, decided June 23, 1937. This is a companion case to the one noted above (*Argonaut Mining Co.*), and holds that a defendant company was not prejudiced by failure of service of notice of hearing, because of the misaddressing of the notice, inasmuch as the company was represented by counsel at the hearing, and the filing of an answer at the hearing constituted a waiver of formal notice of the hearing.

Asbestosis

La Count, Administratrix, v. General Asbestos & Rubber Co., South Carolina Supreme Court, decided June 30, 1937. The employee on account of whose death the heirs are suing in this case worked in the spinning room of the employer's asbestos-products plant. The company alleged that every precaution and every safety method which it had been able to ascertain had been employed, and in the trial court the company's motion for a directed verdict was granted. The Supreme Court reverses the judgment and remands the case, holding that the trial judge was in error in not submitting the case to a jury for a decision under all the testimony in the case. (Employees in the spinning room testified that there was no apparatus for the elimination of dust, and gas masks were not furnished, and that no one in the spinning room had been informed that the inhalation of the dust was dangerous. There was also conflict in the medical testimony.)

Surcharge Reduction

A 75 per cent. reduction in the silicosis surcharge rate on industrial-compensation insurance has been approved by the California Insurance Commission. The reduced surcharges are retroactive to June 1, 1937.

The dust-hazard surcharges were imposed last year after a long series of hearings over the protest of numerous industries affected. Originally the California Section Rating Bureau proposed surcharges of $11.23 per $100 of payroll for underground mining, $14.04 for ore milling and $2.81 for surface mining. Because of the strong protest against these rates, the rates actually put into effect last year were $0.56 for surface mining, $2.24 for underground mining and $1.40 for ore milling. Now these last surcharges have been cut by 75 per cent., which is taken as an indication of a trend towards elimination of the surcharges.

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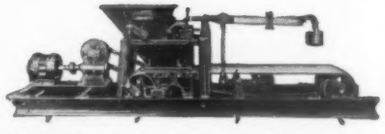

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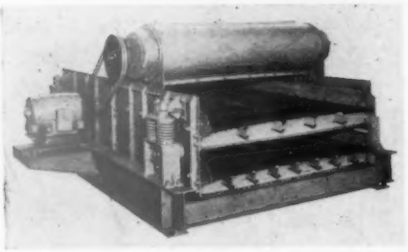
New Machinery and Supplies

●Vibrating Screen

In the Eliptex screen, a new product of the Robins Conveying Belt Co., New York, N. Y., the exceptionally effective screening and feeding action at high capacity is due to the unique elliptical motion. This motion is uniform throughout every square foot of the screening surface. The direction of elliptical motion is counterflow.

The combination of sloping ellipse and counterflow direction results in two advantageous features: it turns the material over giving complete screening action, and it also propels the material horizontally to give the effective feeding action.



Unique elliptical motion is featured in this new screen.

The rapidity of this motion is said to produce a powerful ejecting force—equally effective at all points—which is proof against blinding or plugging of the screen cloth.

The Eliptex screen is standardized in widths of 3 to 6 ft. and in lengths of 7 to 16 ft. and is available in single, double, or triple deck and for floor or suspended mounting.

The vibrator consists of two shafts geared together and revolving at high speed. These shafts are fitted with unbalanced weights, one of which is heavier than the other. When revolving they produce a compound centrifugal force that gives the screen its uniform elliptical motion. Precision cut helical gears, running in oil, assure quiet operation and long life.

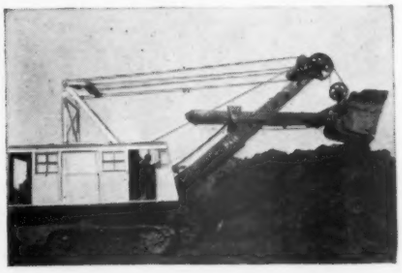
Two or more identical and interchangeable screen cloth panels are used on each deck. This allows the replacement of the panel which wears out first, without disturbing the other panels.

The cloth is mounted on rubber covered "bucker-up" bars which give a slight transverse arch to the screening surface. Spring-tensioned bolts automatically maintain the rigidity of the panels. This construction not only prevents premature failure through whipping and crystallization, but also helps to distribute the material uniformly over the entire width of the screen.

●Excavator

Answering the demand for large excavators with higher operating speeds, the Harnischfeger Corp., Milwaukee, Wis., announces the new P&H Model 955 shovel—a high-speed, fully convertible machine with a capacity of 2½-cu. yd.

Presented as an entirely new machine with many advanced features, tons of dead weight have been removed from the 955 because of arc-welded construction throughout—in the upper revolving deck, the lower car body, crawler side cranes and the digging attachment.



This 2½-cu. yd. shovel answers a demand for higher operating speed.

Heavy-duty roller bearings have been used wherever they add efficiency—on the swing clutches, hoist drum, crowd drum and all parts that receive terrific punishment in a day's operation. This eliminates all trouble caused by bushing wear.

This 25-ton locomotive crane, built by the American Hoist & Derrick Co., St. Paul, Minn., recently went into service at the plant of the Marquette Cement Mfg. Co. at Cape Girardeau, Mo. It is powered by a Hercules 100-hp. Diesel engine.

Powered by an 8-cylinder 185 hp. Fairbanks-Morse Diesel engine, the 955 is simple, economically-operated and gives snappy, quick response to controls for easier handling. Special tandem drum arrangement insures parallel cable pull to and over the center line of the machine eliminating excessive cable wear. Split sprocket lagging is provided for quick change-over for shovel service.

As a dragline, the 955 assures exceptionally large daily yardage over wider cleanup areas. Equipped with long crawlers with 36" width shoes or wider if necessary, provision has also

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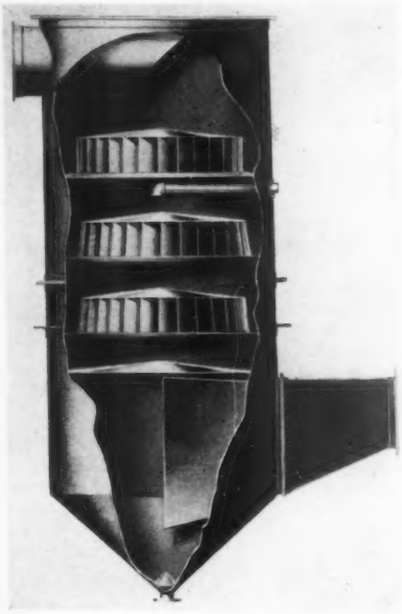
been made for an easy changeover to longer "cats" further to reduce ground pressure on exceptionally soggy ground.

●Dust-Collector

The Claude B. Schneible Co., Chicago, Ill., is introducing a junior multi-wash dust-collector. This new model possesses the same major operating advantages as the senior collector except that dirty air, gases, or fumes are



Junior multi-wash dust-collector.

scrubbed five times by an impingement plate arrangement instead of thirteen times as in the larger model.

The junior collector has been designed primarily for single function operations such as: pulverizers, crushers, sand-conditioning units, sifters and separators, packaging machines, driers, grinders, and innumerable other places where it is desired to clean up a single operation.

●Mixing Plant

A new folding-type portable bituminous-mixing plant, particularly designed for secondary road work, has recently been announced by Hetherington & Berner, Inc., Indianapolis, Ind. The plant, which is adapted to standard flat bed truck or trailer hauling, consists of two units, the drier unit and the screening and mixing unit.

The drier unit, with a 60-in. by 24-ft. drum, is loaded on a standard truck and trailer and hauled to location. A steel subframe, straddling the truck, is attached, allowing the truck and trailer to pull away. The mixer platform bin, 2,000-lb. mixer and mixer drive and section of hinged A-frame, are transported as one unit on a steel skid frame. The skid frame is used as a gantry for erecting the remaining plant units. The hot material elevator, completely assembled with jib crane, swings into place on a special hinged base.

Features of this plant are the use of SKF bearings throughout, a fully-inclosed vibrating

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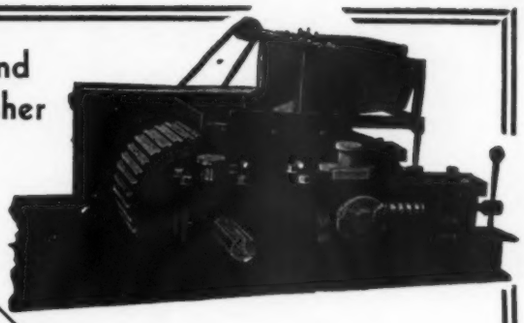
NEW HOLLAND Crushers and Screens



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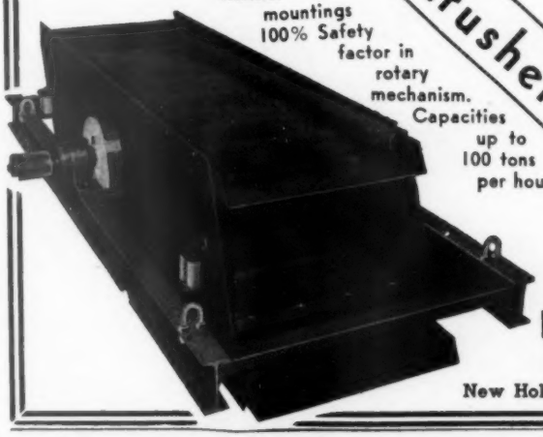

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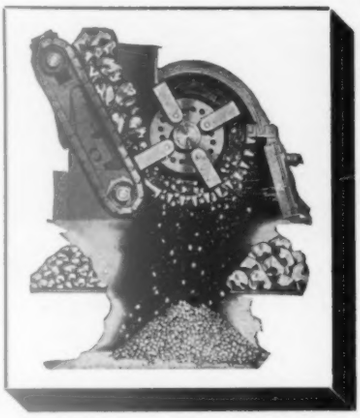

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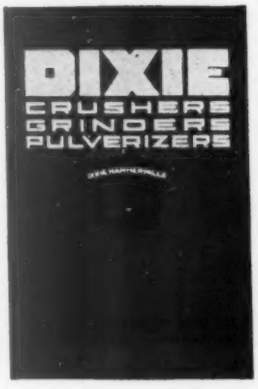

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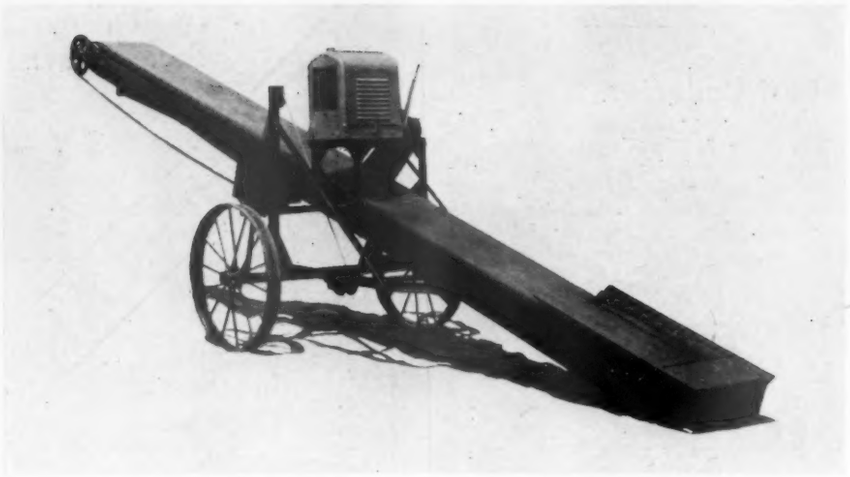


The model B-18 portable belt-conveyor.

screen, a steam-jacketed steam-operated steel mixer, large-size combustion chamber and dust collector. Separate power units are provided on the drier, mixer and screen, with gasoline, Diesel or electric power as desired.

●Improved Clutch

The main clutch cushion in the hoist drum on new line of smaller Northwest shovels reduces maximum stresses on all parts under power when the hoist rope is tensioned, transmitting full engine power, yet adding materially to life of machine. According to the maker, Northwest Engineering Co., Chicago, Ill., maximum loads on drum shafts are reduced by 50 per cent. and drum-clutch adjustments three to five times. When dipper teeth hit immovable rock, the operator has more time to throw out the clutch to prevent engine stalling, jolts and jars are minimized, and fast and smooth action results. Working in rough material, the life of the hoist rope is said to be lengthened by this cushioning action of clutch.

●Portable Conveyor

Low first cost, lightweight yet sturdy construction, and low operating costs are the principal features of the new Model B-18 Atlas conveyor, which has just been announced by the Atlas Conveyor Co., Clintonville, Wis.

According to the manufacturer, the new machine fills a long-felt need for a conveyor to sell at low cost, but to handle a multiplicity of jobs.

With a capacity of 30 to 70 tons of material per hour, the conveyor is large enough to handle the work required of it. The machine is 20 ft. long, and is constructed for use with either a gasoline engine, or an electric motor. It may also be purchased without power, if desired.

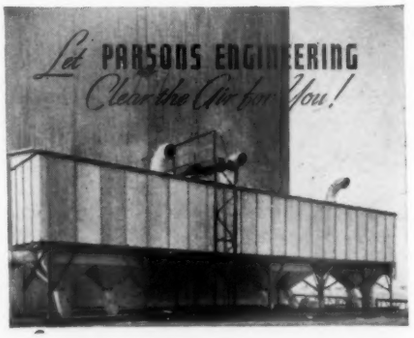
Other features include: belt width, 18 in.; electrically-welded angles; 30 to 70 tons per hour capacity depending upon material, and continuous uniform loading.

The belt is rubber-covered, 4-ply; head and foot pulleys are all steel and machine-crowned. Take-ups are at loading end with adjustable screws. A head pulley adjustment is provided to allow easy belt alignment.

Drive is accomplished through chain and sprockets. Loading height of the machine is 12 in., and the discharging height, 8 ft., 6 in. Width over all is 5½ ft.

●Wire-Line Roller

Less than six months ago, the Patterson-Ballagh Corp. developed and introduced to various interested industries a new type of cable or wire-line roller. To date they have received numerous orders for this new product which affords many outstanding advantages in both construction and operation. Several



A 15-year record of repeat business would imply that sound Parsons engineering is worthy of *your* investigation, too. Parsons' patented oval bag principle, long life, low dust count and minimum maintenance enable Parsons Dust Arrestors to excel in the cement industry. Write for our Bulletin DA-6.

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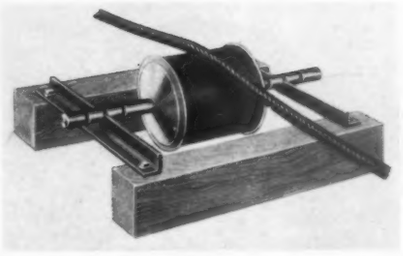


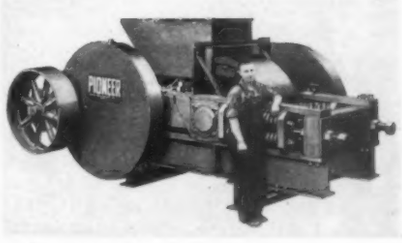
Wire-line roller showing cable running over rubber-covered drum.

well-known construction engineers, identified with jobs requiring smooth running wire-lines, have been very enthusiastic about the new equipment. Simple, compact, and easily adjusted, it may be installed at whatever point the cable may be encountering friction. Unlike wooden rollers, it resists wear and operates freely. There is no metal to metal contact, thus eliminating sparking with resultant fire hazard. The bearings used in the P-B line roller need no lubrication or attention because the shaft housing has a permanent grease pack. It is impossible for the roller to get out of alignment, and it may be adjusted from side to side by simply moving the shaft to a different slot adjacent with the rails. It is practically dust-proof and waterproof, and perfectly balanced, so that maintenance costs are reduced to a minimum.

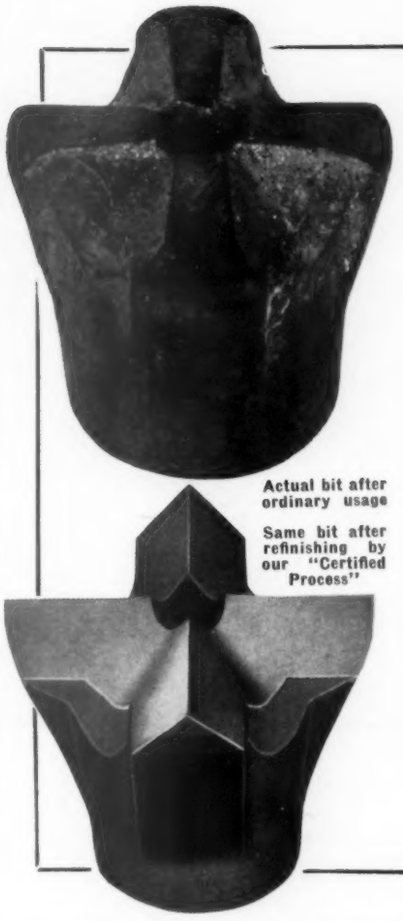
Full details may be obtained by writing the Patterson-Ballagh Corp., 1900 E. 65th St., Los Angeles, California.

●First-Aid Kit

A new type of Brac-Kit, a first-aid kit designed especially for industrial use, has been developed by the Davis Emergency Equipment Co., New York, N. Y. The kit containing the first-aid supplies is firmly locked, with a dust-proof and water-proof seal, in an outer case, which can be permanently mounted in any convenient location. This permits Brac-Kits to be located at various points in plants, offices, and warehouses, on service trucks and buses, and other places where first-aid may be needed. The kit holds ten unit-cartons containing dressings and treatments which can be selected to meet any needs. Provision is made for a wire seal to prevent unauthorized removal of supplies.



The Pioneer Gravel Equipment Mfg. Co. has announced a new and larger roll crusher. The rolls are each 54 in. in diameter and 24 in. wide. The machine was designed for the commercial quarries and for the larger plants that require greater production and a larger stage of reduction. The crusher includes manganese-steel shells, positive adjustment, star gear drive, Timken bearings, spring release, and inclosed gear drive.



Actual bit after ordinary usage

Same bit after refinishing by our "Certified Process"

100% EFFICIENCY

in New Method of Resharpening Bits

Get 100 per cent efficiency from our new, perfected method of resharpening bits, and save enough to justify shipment from any part of the country. Here is what our process does for you at a small fraction of the cost of buying new bits.

Each bit is normalized to take out strains in the steel from previous drilling. It is machined to its original cutting edge and clearance angle, one size smaller in gauge. The bit is hardened by reheating in a Pyrometer-controlled furnace, thereby eliminating guesswork, then it is coated with adhesive oil to prevent rusting and packed in a box marked for size and make.

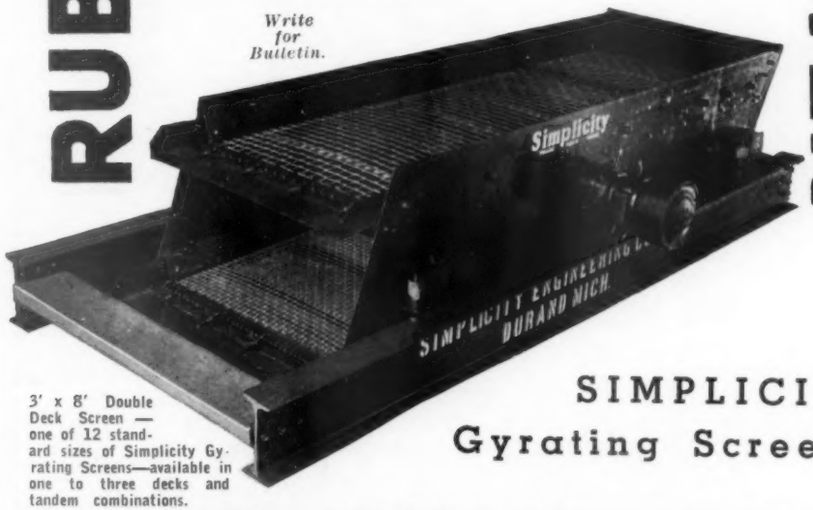
FREE OFFER: Send us a few of your worn bits. We will recondition and resharpen them and return them to you, good as new, without cost or obligation.

ROCK BIT SALES & SERVICE, INC.
2514 East Cumberland St., Philadelphia, Pa.

RUBBER · CUSHIONED · POWER

The resilient rubber mounting eliminates external frame vibration and keeps the screening action where it belongs . . . on the entire screening surface. Other outstanding features are the solid counter-balanced shaft, completely protected bearings, four-way tension screen cloth and double crowned deck surface.

Write for Bulletin.



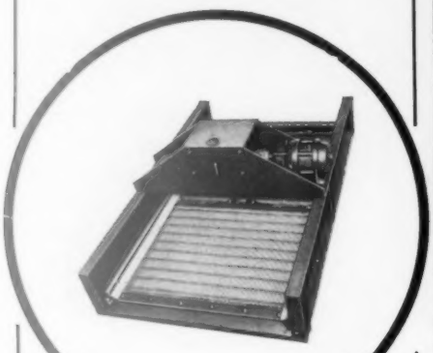
3' x 8' Double Deck Screen — one of 12 standard sizes of Simplicity Gyrating Screens—available in one to three decks and tandem combinations.

SIMPLICITY
Gyrating Screens

SIMPLICITY ENGINEERING COMPANY
DURAND ∴ ∴ MICHIGAN

Fine Screening

by THE Leahy



NO-BLIND SCREEN

Patented differential vibration, giving efficient action over entire working surface of screen, assures utmost uniformity of grading, economy of operation and low maintenance. Write for Bulletin of available types and sizes.

THE ORIGINAL DEISTER CONCENTRATOR COMPANY

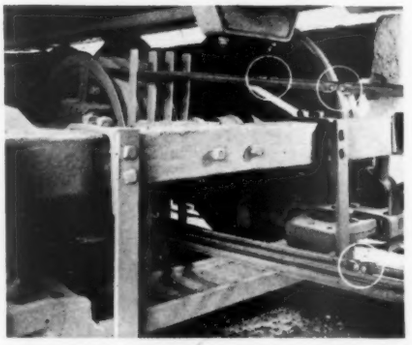
Incorporated 1906

911 Glasgow Ave. Ft. Wayne, Ind.

Surpassing the performance of the widely accepted and popular tractor scraper it replaces, this new 5-cu. yd. model (according to the manufacturers, the Austin-Western Road Machinery Co., Aurora, Ill.) loads with still greater ease and speed. Like its predecessor, the new scraper uses but one cable and one lever to control all loading, carrying and dumping and is designed to work with any tractor within the horsepower range of 35 to 60.

●V-Belt Fastener

A new fastener for joining "C" section "V" belts of fabric core, cross weave construction, is announced by the Flexible Steel Lacing Co. of Chicago. The fastener makes practicable the installation, shortening or replacement of "V" belts on the job without delays or the necessity of tearing down expensive installations.



V-belting installation with belt-fasteners encircled.

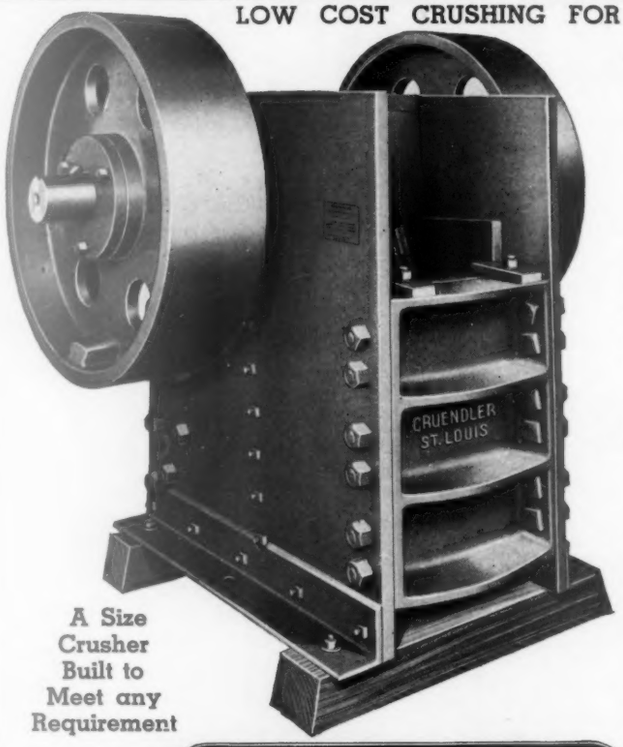
Unique features of the Alligator "V"-belt fastener are the double rocker pin supported in bronze bushings and the method of holding the end plate to the belt end without materially weakening the belt or bulging its sides. The rocker pin is made of special alloy steel hardened to give long lasting service. No metal touches the pulleys.

In line with the expansion program recently announced, the Patterson Foundry & Machine Co. has placed a contract with Allied Engineering Co. for a tunnel kiln to be built at its Porox division at East Liverpool, O. The company has also started the construction of a large normalizing furnace at its steel fabricating department also located at East Liverpool.

●Dump Truck

A new Hug "Lugger," Model 20 has been announced by the Hug Co., Highland, Ill. This new truck, according to the manufacturer, embodies all the features of the well known Model 30 Lugger on a smaller scale, with an 8-cu. yd. body and an unusually high-

LOW COST CRUSHING FOR 52 YEARS



GRUENDLER Roller Bearing All Steel JAW CRUSHERS

For primary as well as fine reduction in stationary, portable or straight line crushing and screening plants.

●

Save 90% in Lubrication Costs and Insure Minimum Maintenance

A Size Crusher Built to Meet any Requirement

Established "1885"

GRUENDLER

Write for Illustrated Bulletins

GRUENDLER CRUSHER & PULVERIZER CO.

2915-21 N. Market St., Dept P. Q., St. Louis, Mo.

Dump truck with 8-cu. yd. body.

dumping-angle hoist. Complete hoist control is had at all angles at all times.

Electric-arc welding throughout the entire chassis is another feature the Hug Company stresses for low maintenance cost, while the operating costs are held to the minimum by the Caterpillar Diesel engine.

Trade Literature

Power Transmission Appliances (Catalog H-531, Part 2). 80 p. Sprout, Waldron & Co., Inc., Muncy, Pa.

American Rod Straightener and Shear Machine (Bulletin 10). American Foundry Equipment Co., Mishawaka, Ind.

On Construction Jobs with Caterpillar Products. 32 p. Caterpillar Tractor Co., Peoria, Ill.

Hose Buyers' Guide. 64 p. Electric Hose and Rubber Co., Wilmington, Del.

Osgood 2-Yard Heavy-Duty (excavators). 12 p. The Osgood Co., Marion, O.

The Original All Steel Mechanical Rivet. (Leaflet.) Multi-Seal Mfg. Co., Chicago, Ill.

American Dustube Dust Control. 24 p. American Foundry Equipment Co., Mishawaka, Ind.

From Start to Finish (earth-moving equipment). 20 p. R. G. LeTourneau, Inc., Peoria, Ill.

Raymond Imp Mill. 8 p. Raymond Pulverizer Division, Combustion Engineering Co., Inc., Chicago, Ill.

Operators' Handbook (tires). B. F. Goodrich Co., Akron, O.

Bucyrus-Erie 2-Wheel Scrapers and *Bucyrus-Erie 4-Wheel Scrapers.* Each, 4 p. Bucyrus-Erie Co., South Milwaukee, Wis.

Places for Power Supplied by "Caterpillar" Diesel Engines. 32 p. Caterpillar Tractor Co., Peoria, Ill.

All Star Revue (air-blast equipment; dust collectors). (Folder.) Pangborn Corp., Hagerstown, Md.

Bulletin No. 21 (illustrative motor and reciprocating drive mountings). 4 p. Ajax Flexible Coupling Co., Westfield, N. Y.

The New Schneible Multi-Louver Dewatering Tanks (Rectangular Type). 4 p. Claude B. Schneible Co., Chicago, Ill.

C-E Nuway Boiler. 16 p. Combustion Engineering Co., Inc., New York, N. Y.

Worthington Horizontal Dry Vacuum Pumps. 8 p. Worthington Pump and Machinery Corp., Harrison, N. J.

Coming Events

October 8-9, 1937, Urbana, Ill.—Mineral Industries Conference, University of Illinois.

January 17-22, 1938, Cleveland, Ohio. — Annual Road Show, American Road Builders' Assn., Cleveland Auditorium.

January 24-26, 1938, Cincinnati, Ohio. — Twenty-first annual convention and machinery exhibition, National Crushed Stone Assn., Netherland Plaza Hotel.

February 1-3, 1938, Cincinnati, Ohio. — Twenty-second annual convention and machinery exhibition, National Sand & Gravel Assn., Netherland Plaza Hotel.

February 1-3, 1938, Cincinnati, Ohio. — Annual convention and machinery exhibition, National Ready Mixed Concrete Assn., Netherland Plaza Hotel.

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OF EXPERIENCE AND SKILL

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THE once necessary evil of using *heavier* pipe than was needed in order to obtain the required *strength*, was wiped out when Taylor Forge pioneered spiral pipe.

That spiral seam makes it possible to produce a pipe that is light walled, and therefore less expensive to buy, ship, and use—yet strong in every way, thanks to the spiral reinforcement which stiffens it from end to end—holds it round and true against collapsing strains—gives it bursting strength even beyond that of a seamless tube of equal gauge.

You simply choose the gauge you need for the job, never paying a penalty for superfluous weight. Let it cut the cost of water, sand and gravel lines. Ask for the new Catalog 36.

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TAYLOR Spiral PIPE

ASK FOR CATALOG 36

BUYERS' GUIDE

A Directory of Pit and Quarry Advertisers Indexed According to Product.

Although every effort is made to insure accuracy and completeness in these listings, the publisher cannot accept responsibility for errors or omissions. Any mistakes discovered will gladly be rectified.

Index to Advertisers on Page 104

Aggregate-Bituminizing Plants
Hetherington & Berner, Inc.
*Warren Brothers Roads Co.

Agitating Ladders (Dredge)
*Eagle Iron Works
Pettibone-Mulliken Corp.

Agitators, Thickeners and Slurry Mixers
*Hardinge Co.
*Traylor Engr. & Mfg. Co.

Air Compressors (Portable)
*Chicago Pneumatic Tool Co.
*Fuller Company
Gardner-Denver Co.

Air Compressors (Stationary)
*Chicago Pneumatic Tool Co.
Gardner-Denver Co.

Air Filters
*Blaw-Knox Co.
Dracco Corporation
*Parsons Engineering Corp.
*Sly Mfg. Co., W. W.
*Western Precipitation Co.

Air Pumps
*Fuller Company
Gardner-Denver Co.
Independent Pneu. Tool Co.

Air Separators
Bradley Pulverizer Co.
*Gruendler Crusher & Pulverizer Co.
*Hardinge Co.
*Raymond Pulverizer Div. of Combustion Engr. Co., Inc.
*Sly Mfg. Co., W. W.
Sturtevant Mill Co.
*Williams Patent Crusher & Pulverizer Co.

Alloys (Steel)
American Manganese Steel Co
Frog Switch & Mfg. Co.
Stulz-Sickles Co.

Arrestors (Lightning)
*General Electric Co.

Ash and Refuse-Handling Equipment
Allen-Sherman-Hoff Co.
American Manganese Steel Co.
Bartlett & Snow Co., C. O.
Haiss Mfg. Co., Geo.
Hetherington & Berner, Inc.
*Jeffrey Mfg. Co.
*Link Belt Co.
*Robins Conveying Belt Co.

Asphalt Mixing Plants
Hetherington & Berner, Inc.
*Warren Brothers Roads Co.

Automatic Feeders
American Manganese Steel Co.
Bartlett & Snow Co., C. O.
Bradley Pulverizer Co.
*Fuller Company.
*Hardinge Co.
*Jeffrey Mfg. Co.
*Link Belt Co.
Schaffer Poidometer Co.

Automatic Weighers
Bartlett & Snow Co., C. O.
*Blaw-Knox Co.
*Fuller Company
Howe Scale Co.
*Jaeger Machine Co.
Schaffer Poidometer Co.

Backfillers
*Bucyrus-Erie Co.
Continental Roll & Steel Foundry Co.
*Harnischfeger Corp.
Lima Locomotive Works, Inc.

Backfill Tampers
Independent Pneu. Tool Co.
Northwest Engr. Co.

Balls (Grinding)
Bartlett & Snow Co., C. O.
*Hardinge Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Traylor Engr. & Mfg. Co.

Balls (Tube-Mill, etc.)
*Allis-Chalmers Mfg. Co.
Bartlett & Snow Co., C. O.
*Hardinge Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Traylor Engr. & Mfg. Co.

Batteries
*General Electric Co.
Goodyear Tire & Rubber Co.

Bearings (Anti-Friction)
Bartlett & Snow Co., C. O.
Hetherington & Berner, Inc.
*Jeffrey Mfg. Co.
*Link-Belt Co.
Robins Conveying Belt Co.
S-K-F Industries, Inc.
*Sprout, Waldron & Co.
Timken Roller Bearing Co.

Bearings (Ball)
S-K-F Industries, Inc.

Bearings (Roller)
S-K-F Industries, Inc.
Timken Roller Bearing Co.

Belt Fasteners
Flexible Steel Lacing Co.

Belting
*Cincinnati Rubber Mfg. Co.
Goodyear Tire & Rubber Co.
Haiss Mfg. Co., Geo.
*Jeffrey Mfg. Co.
*Link-Belt Co.
Republic Rubber Co.
*Robins Conveying Belt Co.
*Sprout, Waldron & Co.

Belting (Multiple V)
Goodyear Tire & Rubber Co.
Republic Rubber Co.

Belt Lacings
Flexible Steel Lacing Co.

Belts (Fan)
Goodyear Tire & Rubber Co.
Republic Rubber Co.

Bin Gates
Allen-Sherman-Hoff Co.
Bartlett & Snow Co., C. O.
*Fuller Company.
Haiss Mfg. Co., Geo.
*Hendrick Mfg. Co.
Iowa Mfg. Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Link-Belt Co.
McLanahan and Stone Corp.
*Robins Conveying Belt Co.
Smith Engr. Works
*Sprout, Waldron & Co.

Bins (Cast Iron)
Allen-Sherman-Hoff Co.

Bins (Steel)
Bartlett & Snow Co., C. O.
*Hendrick Mfg. Co.
Hetherington & Berner, Inc.
Iowa Mfg. Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Link-Belt Co.
McLanahan and Stone Corp.
*Robins Conveying Belt Co.
*Sprout, Waldron & Co.

Blast-Hole Drills (See Drills—Blast-Hole)

Blasting Supplies
*Ensign-Bickford Co.

Block Machines (Concrete)
Dunn Mfg. Co.

Blocks (Pillow)
*Jeffrey Mfg. Co.

Blocks (Sheave)
American Manganese Steel Co.
Haiss Mfg. Co., Geo.
*Sauerman Bros., Inc.
*Sprout, Waldron & Co.

Blowers
*Sly Mfg. Co., W. W.

Bodies (Car and Motor Truck)
Easton Car and Const. Co.

Bodies (Motor Truck, Concrete Mixing)
Bartlett & Snow Co., C. O.
*Blaw-Knox Co.
Jaeger Machine Co.

Boots (Rubber)
Goodyear Tire & Rubber Co.

Borings, Core
Hoffman Bros. Drilling Co.
Pennsylvania Drilling Co.

Breakers (Circuit)
*General Electric Co.

Brick Machines (Concrete)
Dunn Mfg. Co.

Brick Manufacturing Equipment
Dunn Mfg. Co.

Bronze Work (Ornamental)
National Wire Cloth Co.
*Tyler Co., W. S.

Bucket Elevators (See Conveyors and Elevators)

Buckets (Clamshell, Orange-Peel, Etc.)
Bartlett & Snow Co., C. O.
*Blaw-Knox Co.
Haiss Mfg. Co., Geo.
*Harnischfeger Corp.
*Link-Belt Co.
Owen Bucket Co.
Pettibone-Mulliken Corp.
Wellman Engr. Co.

Buckets (Dump)
*Jaeger Machine Co.

Buckets (Dragline—Cableway)
American Manganese Steel Co.
Bartlett & Snow Co., C. O.
*Bucyrus-Erie Co.
*Link-Belt Co.
*Sauerman Bros., Inc.
Wellman Engr. Co.

Buckets (Elevator and Conveyor)
Bartlett & Snow Co., C. O.
Cross Engineering Co.
Haiss Mfg. Co., Geo.
*Hendrick Mfg. Co.
Iowa Mfg. Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
McLanahan and Stone Corp.
Pettibone-Mulliken Corp.
*Robins Conveying Belt Co.
Smith Engr. Works
*Sprout, Waldron & Co.

Buggies (Dump)
Easton Car and Const. Co.
*Koehring Co.
Le Tourneau Inc., R. G.

Bulk-Cement Storage Plants
*Sprout, Waldron & Co.

Bulldozers
Le Tourneau Inc., R. G.

Cableways
*Leschen & Sons Rope Co., A.
*Link-Belt Co.
Roebling's Sons Co., John A.
*Sauerman Bros., Inc.

Capstans (See Winches and Capstans)

Car Dumpers
*Link-Belt Co.
Wellman Engr. Co.

Car Liners (Paper)
Hummel-Foley Corp.

Car Pullers
Bartlett & Snow Co., C. O.
*Jeffrey Mfg. Co.
*Link-Belt Co.

Carriers
Bartlett & Snow Co., C. O.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Robins Conveying Belt Co.
Smith Engr. Works
*Sprout, Waldron & Co.

Carryalls
Easton Car and Const. Co.
*Koehring Co.
LeTourneau, Inc., R. G.

Car Wheels — (See Wheels — Car)

Cars (Quarry and Gravel Pit)
Easton Car and Const. Co.

Castings
American Manganese Steel Co.
Bartlett & Snow Co., C. O.
*Eagle Iron Works
Frog Switch & Mfg. Co.
*Hardinge Co.
Hetherington & Berner, Inc.
Holmes & Bros., Inc., Robt.
Iowa Mfg. Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Link-Belt Co.
McLanahan and Stone Corp.
Pettibone-Mulliken Corp.
*Robins Conveying Belt Co.
*Sprout, Waldron & Co.

Cement Pumps (See Pumps; Air Pumps; Pumps, Cement Slurry; Pumps, Bulk Cement)

Central Concrete Mixing Plants (Comp.)
Bartlett & Snow Co., C. O.
*Jaeger Machine Co.
*Sprout, Waldron & Co.

Chain Attachments
*Jeffrey Mfg. Co.

Chain (Dredge and Shovel)
Manganese Steel Forge Co.

Chain Drives
*Jeffrey Mfg. Co.
*Link-Belt Co.

Chain (Elevating and Conveying)
American Manganese Steel Co.
Bartlett & Snow Co., C. O.
Cross Engineering Co.
Haiss Mfg. Co., Geo.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Sprout, Waldron & Co.

Chute Lining (Rubber)
Goodyear Tire & Rubber Co

Chutes and Chute Liners
American Manganese Steel Co.
Bartlett & Snow Co., C. O.
Cross Engineering Co.
Haiss Mfg. Co., Geo.
*Hendrick Mfg. Co.
Iowa Mfg. Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
McLanahan and Stone Corp.
*Robins Conveying Belt Co.
*Sprout, Waldron & Co.

Classifiers
Bradley Pulverizer Co.
*Deister Machine Co.
*Hardinge Co.
Iowa Mfg. Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Foundry & Machine Co.
*Link-Belt Co.
*Nordberg Mfg. Co.
Simplicity Engr. Co.

Clips (Wire Rope)
*Leschen & Sons Rope Co., A.
Roebling's Sons Co., John A.

Clutches
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Sprout, Waldron & Co.

Coal-Pulverizing Equipment
*Allis-Chalmers Mfg. Co.
Bartlett & Snow Co., C. O.
Bradley Pulverizer Co.
*Hardinge Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Raymond Pulverizer Div. of Combustion Engr. Co., Inc.
*Traylor Engr. & Mfg. Co.
*Williams Patent Crusher & Pulverizer Co.

Compressors (See Air Compressors)

Concentrators (Slurry)
*Deister Concentrator Co.

Concrete Breakers (Air)
*Chicago Pneumatic Tool Co.
Gardner-Denver Co.
Independent Pneu. Tool Co.

Concrete Mixers
*Blaw-Knox Co.
*Jaeger Machine Co.
*Koehring Co.

Concrete Products Plant Equipment
Universal Concrete Pipe Co

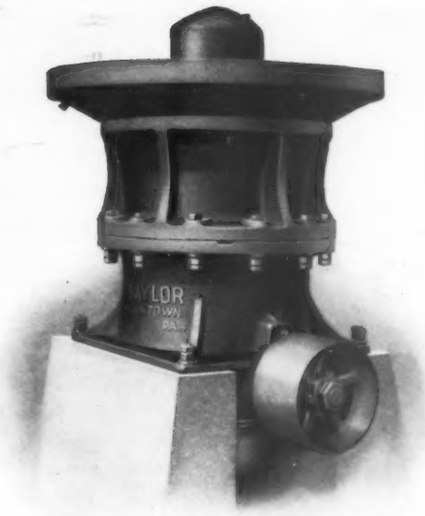
Concrete Slab-Raising Equipment (Mud-Jacks)
*Koehring Co.

Condensers
*Chicago Pneumatic Tool Co.

Cones (Sand-Washing)
Bartlett & Snow Co., C. O.
Iowa Mfg. Co.
*Link-Belt Co.
Smith Engr. Works

Controllers (Electric)
*General Electric Co.

* See also information in the 1937 Pit and Quarry HANDBOOK.



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TYPE TY
REDUCTION CRUSHER

If volume of sales and the commendatory letters of users mean anything, this machine is "tops" among reduction crushers today available.

When we designed this Type TY Crusher we aimed to produce, at a reasonable selling price, a thoroughly reliable high producing, high efficiency reduction unit, and we have succeeded.

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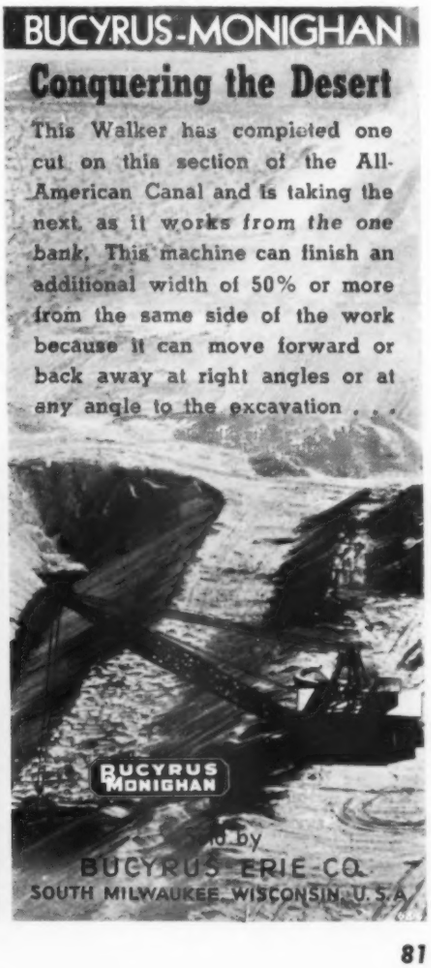
BUCYRUS-ERIE
EXCAVATING, DRILLING, AND MATERIAL HANDLING EQUIPMENT... SOUTH MILWAUKEE, WISCONSIN, U.S.A.


BUCYRUS-MONIGHAN
Conquering the Desert
This Walker has completed one cut on this section of the All-American Canal and is taking the next, as it works from the one bank. This machine can finish an additional width of 50% or more from the same side of the work because it can move forward or back away at right angles or at any angle to the excavation . . .
BUCYRUS MONIGHAN
BUCYRUS-ERIE CO.
SOUTH MILWAUKEE, WISCONSIN, U.S.A.

BUYERS' GUIDE

A Directory of Pit and Quarry Advertisers Indexed According to Product.

Index to Advertisers on Page 104

Converters (Electric)
*General Electric Co.

Conveyor Belting (See Belting)

Conveyor Idlers and Rolls
Bartlett & Snow Co., C. O.
Haiss Mfg. Co., Geo.
Iowa Mfg. Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Robins Conveying Belt Co.

Conveyors and Elevators
Allen-Sherman-Hoff Co.
*Allis-Chalmers Mfg. Co.
Bacon, Inc., Earle C.
Bartlett & Snow Co., C. O.
Cross Engineering Co.
Dracco Corporation
*Fuller Company
*Gruendler Crusher & Pulverizer Co.
Haiss Mfg. Co., Geo.
*Hendrick Mfg. Co.
Holmes & Bros., Inc., Robt.
Iowa Mfg. Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Foundry & Machine Co.
*Link-Belt Co.
McLanahan and Stone Corp.
New Holland Machine Co.
*Robins Conveying Belt Co.
Smith Engr. Works
*Sprout, Waldron & Co.
Sturtevant Mill Co.
Universal Crusher Co.

Conveyors (Pneumatic)
Dracco Corporation

Conveyors (Ready-Mixed Concrete)
Bartlett & Snow Co., C. O.
*Blaw-Knox Co.
Haiss Mfg. Co., Geo.
*Jaeger Machine Co.
*Link-Belt Co.
*Robins Conveying Belt Co.

Conveyors (Screw)
*Jeffrey Mfg. Co.

Conveyors (Vibrating)
*Jeffrey Mfg. Co.

Coolers (Clinker)
*Allis-Chalmers Mfg. Co.
*Traylor Engr. & Mfg. Co.

Coolers (See Kilns and Coolers—Rotary)

Couplings (Air, Hose, Pipe Etc.)
*Chicago Pneumatic Tool Co.

Couplings (Flexible and Shaft)
Erie Pump & Engine Works
Independent Pneu. Tool Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Robins Conveying Belt Co.
*Sprout, Waldron & Co.

Cranes (Crawler and Locomotive)
*Bay City Shovels, Inc.
*Bucyrus-Erie Co.
*Harnischfeger Corp.
*Koehring Co.
Lima Locomotive Works, Inc.
Michigan Power Shovel Co.
*Link Belt Co.
Northwest Engr. Co.
Thew Shovel Co.

Cranes (Electric Traveling)
*Harnischfeger Corp.

Cranes (Overhead)
*Harnischfeger Corp.

Crusher Hammers
Electric Steel Fdry Co.

Crusher Parts
American Manganese Steel Co.
*American Pulverizer Co.
Bartlett & Snow Co., C. O.
Frog Switch & Mfg. Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
McLanahan and Stone Corp.
Pettibone-Mulliken Corp.
*Traylor Engr. & Mfg. Co.

Crushers (Cone)
*Nordberg Mfg. Co.

Crushers (Hammer)
*Allis-Chalmers Mfg. Co.
*American Pulverizer Co.
Bartlett & Snow Co., C. O.
Bradley Pulverizer Co.
*Dixie Machy. Mfg. Co.
*Gruendler Crusher & Pulverizer Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Sturtevant Mill Co.
*Williams Patent Crusher & Pulverizer Co.

Crushers (Jaw and Gyratory)
*Allis-Chalmers Mfg. Co.
Bacon, Inc., Earle C.
Bartlett & Snow Co., C. O.
*Gruendler Crusher & Pulverizer Co.
Iowa Mfg. Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Foundry & Machine Co.
New Holland Machine Co.
*Nordberg Mfg. Co.
Smith Engr. Works
*Traylor Engr. & Mfg. Co.
Universal Crusher Co.

Crushers (Ring)
*American Pulverizer Co.
Bartlett & Snow Co., C. O.
*Williams Patent Crusher & Pulverizer Co.

Crushers (Roll)
*Allis-Chalmers Mfg. Co.
*American Pulverizer Co.
Bartlett & Snow Co., C. O.
*Gruendler Crusher & Pulverizer Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Link-Belt Co.
McLanahan and Stone Corp.
New Holland Machine Co.
*Robins Conveying Belt Co.
Universal Crusher Co.
*Williams Patent Crusher & Pulverizer Co.

Crushers (Rotary)
*Allis-Chalmers Mfg. Co.
*American Pulverizer Co.
Bartlett & Snow Co., C. O.
New Holland Machine Co.
*Williams Patent Crusher & Pulverizer Co.

Crushing Rolls
*Allis-Chalmers Mfg. Co.
American Manganese Steel Co.
Bartlett & Snow Co., C. O.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Link-Belt Co.
McLanahan and Stone Corp.
New Holland Machine Co.
Sturtevant Mill Co.
*Traylor Engr. & Mfg. Co.
*Williams Patent Crusher & Pulverizer Co.

Diesel Engines (See Engines—Diesel)

Diggers (Clay)
Independent Pneu. Tool Co.
*Ingersoll-Rand Co.

Dipper Parts
American Manganese Steel Co.
Frog Switch & Mfg. Co.
Pettibone-Mulliken Corp.

Dippers and Teeth (Power Shovel)
American Manganese Steel Co.
*Bucyrus-Erie Co.
Frog Switch & Mfg. Co.
*Koehring Co.
Pettibone-Mulliken Corp.

Doors (Car)
Hummel-Foley Corp.

Dragline Cableway Excavators
*Bucyrus-Erie Co.
Lima Locomotive Works, Inc.
*Link-Belt Co.
*Sauerman Bros., Inc.

Dragline Excavators
*Bay City Shovels, Inc.
*Bucyrus-Erie Co.
*Harnischfeger Corp.
*Koehring Co.
*Link-Belt Co.
Michigan Power Shovel Co.
Northwest Engr. Co.
Thew Shovel Co.

Draglines (Walking)
*Bucyrus-Monighan Co.

Dredges
*Bucyrus-Erie Co.
Hetherington & Berner, Inc.
*Morris Machine Works

Drill Bit Reconditioning
Rock Bit Sales & Service, Inc.

Drill Bits
*Chicago Pneumatic Tool Co.

Drilling Accessories
*Chicago Pneumatic Tool Co.
Cleveland Rock Drill Co.
Gardner-Denver Co.
Independent Pneu. Tool Co.
Rock Bit Sales & Service, Inc.
Timken Roller Bearing Co.

Drilling Contractors
Hoffman Bros. Drilling Co.
Pennsylvania Drilling Co.

Drills (Blast-Hole)
*Chicago Pneumatic Tool Co.
Cleveland Rock Drill Co.
Gardner-Denver Co.
Independent Pneu. Tool Co.

Drills (Core)
Hoffman Bros. Drilling Co.
Pennsylvania Drilling Co.

Drills (Diamond)
*Chicago Pneumatic Tool Co.
Hoffman Bros. Drilling Co.
Pennsylvania Drilling Co.

Drills (Hand-Hammer)
*Chicago Pneumatic Tool Co.
Cleveland Rock Drill Co.
Gardner-Denver Co.
Independent Pneu. Tool Co.

Drills (Rock)
*Chicago Pneumatic Tool Co.
Cleveland Rock Drill Co.
Gardner-Denver Co.
*Jeffrey Mfg. Co.

Drill Sharpening Machinery
Gardner-Denver Co.

Drill Steel
*Chicago Pneumatic Tool Co.
Cleveland Rock Drill Co.
Independent Pneu. Tool Co.

Drills (Well) (See Drills—Blast-Hole)

Drives (Multiple, Belt, Chain, Rope)
*Allis-Chalmers Mfg. Co.

Dryers
*Allis-Chalmers Mfg. Co.
Bartlett & Snow Co., C. O.
*Hardinge Co.
Iowa Mfg. Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Fdry. & Mch. Co.
McLanahan and Stone Corp.
*Traylor Engr. & Mfg. Co.
*Tyler Co., W. S.

Dust Arresters
Bartlett & Snow Co., C. O.
*Blaw-Knox Co.
Dracco Corporation
*Parsons Engineering Corp.
*Sly Mfg. Co., W.W.
*Western Precipitation Corp.

Dust Collecting Systems
Allen-Sherman-Hoff Co.
*Allis-Chalmers Mfg. Co.
*Blaw-Knox Co.
Dracco Corporation
*Parsons Engineering Corp.
*Raymond Pulverizer Div. of Combustion Engr. Co., Inc.
*Sly Mfg. Co., W.W.
*Western Precipitation Corp.

Dust Conveying Systems
Allen-Sherman-Hoff Co.
Bartlett & Snow Co., C. O.
*Blaw-Knox Co.
Dracco Corporation
*Fuller Company
*Parsons Engineering Corp.
*Sly Mfg. Co., W.W.
*Western Precipitation Corp

Dust Filters
*Parsons Engineering Corp.
*Sly Mfg. Co., W.W.
*Western Precipitation Corp

Dust Handling Systems (Hydro Vacuum)
Allen-Sherman-Hoff Co.

Dynamite (See Explosives)

Electrical Equipment
*Allis-Chalmers Mfg. Co.
*General Electric Co.

Electrodes (Welding)
Stulz-Sickles Co.

Elevator Belting (See Belting)

Elevators (See Conveyors and Elevators)

Eliminators (Soft Stone) (See Soft Stone Eliminators)

Engineers
*Allis-Chalmers Mfg. Co.
*Arnold & Weigel, Inc.
Bacon, Inc., Earle C.
Bradley Pulverizer Co.
Cross Engineering Co.
*Fuller Company
Hetherington & Berner, Inc.
Holmes & Bros., Inc., Robt.
Iowa Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
McLanahan and Stone Corp.
*Robins Conveying Belt Co.
*Sprout, Waldron & Co.
Sturtevant Mill Co.
*Traylor Engr. & Mfg. Co.

Engine Generator Sets
See Generator Sets (Engine)

Engines (Diesel)
Caterpillar Tractor Co.
*Chicago Pneumatic Tool Co.
Cooper-Bessemer Corp.
National Supply Co. of Del.
*Nordberg Mfg. Co.

Engines (Internal-Combustion)
Caterpillar Tractor Co.
*Chicago Pneumatic Tool Co.
Cooper-Bessemer Corp.
National Supply Co. of Del.
*Nordberg Mfg. Co.

Engines (Steam)
*Morris Machine Works
*Nordberg Mfg. Co.

Excavating Machinery (See Shovels; Cranes; Buckets, etc.)

Excavators—Shallow Grading (Bucket Elevator Type)
Haiss Mfg. Co., Geo.

Fabricating (Electric Arc and Oxy-Acetylene)
Smith Co., S. Morgan
Stulz-Sickles Co.

Fans (Exhaust)
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.

Feeders
*Allis-Chalmers Mfg. Co.
American Manganese Steel Co.
*Arnold & Weigel, Inc.
Bartlett & Snow Co., C. O.
Bradley Pulverizer Co.
*Fuller Company
*Hardinge Co.
Iowa Mfg. Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Link-Belt Co.
*Robins Conveying Belt Co.
Smith Engr. Works
*Sprout, Waldron & Co.
*Traylor Engr. & Mfg. Co.
Universal Crusher Co.

Floor Sweeping Systems (Hydro Vacuum)
Allen-Sherman-Hoff Co.

Forges (Oil)
Gardner-Denver Co.

Fuses (Detonating)
*Ensign-Bickford Co.

Fuses (Electrical)
*General Electric Co.

Gaskets
*Cincinnati Rubber Mfg. Co.
Goodyear Tire & Rubber Co.
Republic Rubber Co.

Gasoline Engines (See Engines—Internal-Combustion)

Gas Producers
Wellman Engr. Co.

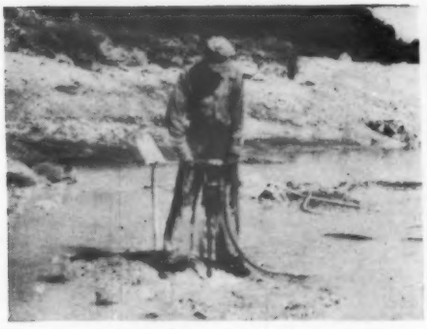
Gates (Bin) (See Bin Gates)

Gates (Clamshell)
Haiss Mfg. Co., Geo.
*Link-Belt Co.

Gears (Herringbone)
Bartlett & Snow Co., C. O.
*General Electric Co.

*See also information in the 1937 Pit and Quarry HANDBOOK.

MORE FOOTAGE



Gardner-Denver "5" Series Sinkers . . . each is a leader in its weight class.

PER SHIFT

Easier to handle . . . approved by drillers everywhere.

EVERY SHIFT

Low maintenance costs . . . reliability established by *performance.*

WRITE FOR FULL DETAILS ON GARDNER-DENVER S-35 . . . S-45 and S-55 SINKERS

GARDNER-DENVER CO.
Quincy, Illinois
SINCE 1859

GARDNER-DENVER

Perfect balance, correct placement and pitch of teeth, sharp-edged lips and smooth "streamlined" interior of AMSCO Renewable Lip Dippers increases shovel efficiency and reduces power costs.

Increase Yardage with AMSCO Renewable Lip Dippers

They load faster and dump quicker because of correct placement of the teeth at the lip corners, the smooth body interior and "streamlined" body taper which reduces resistance to loads being discharged and the rugged door construction with fast operating latch.

The Manganese Steel lips have a sharp cutting edge that reduces digging resistance and can be easily renewed or interchanged. Lips are made in various types each best adapted to a particular digging job. Lips dovetail into body and are keyed in place, being held to the dipper back by "U" bolts; this design insures rigidity and at the same time allows for quick, simple changes. Tooth bases are cast integral with lip so as not to obstruct unloading and to give better support to the teeth.

Because they reduce operator fatigue, take less shovel power and require less maintenance, AMSCO Renewable Lip Dippers are recommended for all shovels and are made in sizes from ¾ yd. to 18 yds., furnished with or without bail and with back lugs arranged to fit any type of dipper stick. (Sizes under ¾ yd. are made without renewable lips.)

Write your shovel maker or our nearest office for complete details.

AMERICAN MANGANESE STEEL COMPANY
Division of The American Brake Shoe & Foundry Company
396 East 14th St., Chicago Heights, Ill.
Foundries at Chicago Heights, Ill.; New Castle, Del.; Denver, Colo.; Oakland, Calif.; Los Angeles, Calif.; St. Louis, Mo. Offices in Principal Cities

AMSCO
TRADE MARK REGISTERED

BUYERS' GUIDE

A Directory of Pit and Quarry Advertisers Indexed According to Product.

Index to Advertisers on Page 104

*Jeffrey Mfg. Co.
*Link-Belt Co.
*Sprout, Waldron & Co.

Gears and Pinions
Bartlett & Snow Co., C. O.
*General Electric Co.
Haiss Mfg. Co., Geo.
*Link-Belt Co.
Pettibone-Mulliken Corp.
*Sprout, Waldron & Co.

Gelatin (See Explosives)

Generators (See Motors and Generators)

Generator Sets (Engine)
*General Electric Co.
National Supply Co. of Del.

Generator Sets (Motor)
*General Electric Co.

Generator Sets (Turbine)
*General Electric Co.

Glass Sand Equipment
Lewistown Foundry & Machine Co.

Grab Buckets (See Buckets—Clamshell, Orange - Peel, etc.)

Grapples
Owen Bucket Co.

Grating (Steel)
Bartlett & Snow Co., C. O.
*Blaw-Knox Co.
*Hendrick Mfg. Co.

Greases
*The Gredag Corp.

Grinding Balls (See Balls, Grinding)

Grizzly Feeders
*Jeffrey Mfg. Co.
*Traylor Engr. & Mfg. Co.

Grizzlies
*Allis-Chalmers Mfg. Co.
American Manganese Steel Co.
Bartlett & Snow Co., C. O.
*Eagle Iron Works
*Hendrick Mfg. Co.
Iowa Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Fdy. & Mach. Co.
Pettibone-Mulliken Corp.
*Robins Conveying Belt Co.
Smith Engr. Works

Guards (Wire)
Bartlett & Snow Co., C. O.
National Wire Cloth Co.

Guns (Hydraulic)
Georgia Iron Works
Hetherington & Berner, Inc.
Taylor Forge & Pipe Works

Hammer Mills (See Crushers—Hammer)

Haulage Systems (Electric)
*General Electric Co.

Heaters (Bitumen)
Easton Car and Const. Co.

Hoists
Bartlett & Snow Co., C. O.
*Chicago Pneumatic Tool Co.
Gardner-Denver Co.
Hetherington & Berner, Inc.
Iowa Mfg. Co.
*Jaeger Machine Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
McLanahan and Stone Corp.
*Sauerman Bros., Inc.
Smith Engr. Works
*Sprout, Waldron & Co.

Hoppers
*Hendrick Mfg. Co.
*Link-Belt Co.

Hose (Air, Steam and Water)
*Chicago Pneumatic Tool Co.
*Cincinnati Rubber Mfg. Co.
Goodyear Tire & Rubber Co.
Independent Pneu. Tool Co.
Republic Rubber Co.

Hose (Radiator-Engine Cooling)
Goodyear Tire & Rubber Co.
Republic Rubber Co.

Hose Couplings (See Couplings)

Hydraulic Guns (See Guns—Hydraulic)

Idlers
American Manganese Steel Co.
Bartlett & Snow Co., C. O.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Robins Conveying Belt Co.
Smith Engr. Works
*Sprout, Waldron & Co.

Kilns and Coolers (Rotary)
*Allis-Chalmers Mfg. Co.
Bartlett & Snow Co., C. O.
*Hardinge Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Traylor Engr. & Mfg. Co.

Kilns (Vertical)
*Arnold & Weigel, Inc.
*Hardinge Co.

Lights (Flood)
*General Electric Co.

Lime-Handling Equipment
*Arnold & Weigel, Inc.
Bartlett & Snow Co., C. O.
*Fuller Company
*Hardinge Co.
Iowa Mfg. Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Raymond Pulverizer Div. of Combustion Engr. Co., Inc.
*Robins Conveying Belt Co.

Lime and Hydrating Plants
*Arnold & Weigel, Inc.
*Hardinge Co.
Traylor Engr. & Mfg. Co.

Lime Kilns
*Arnold & Weigel, Inc.
Bartlett & Snow Co., C. O.
*Hardinge Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.

Liners, Car (Paper)
Hummel-Foley Corp.

Linings (Ball- and Tube-Mill) (See Mill Liners and Linings)

Loaders and Unloaders
Bartlett & Snow Co., C. O.
*Bucyrus-Erie Co.
*Fuller Company
Haiss Mfg. Co., Geo.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Robins Conveying Belt Co.
*Sprout, Waldron & Co.

Locomotives (Diesel-Electric)
*General Electric Co.

Locomotives (Electric, Gas, Steam)
*General Electric Co.
Lima Locomotive Works, Inc.

Locomotives (Gas-Electric)
*General Electric Co.

Locomotives (Oil-Electric)
*General Electric Co.

Locomotives (Storage Battery)
*General Electric Co.
*Jeffrey Mfg. Co.

Locomotives (Trolley-Battery)
*General Electric Co.
*Jeffrey Mfg. Co.

Lubricants
*The Gredag Corp.

Magnetic Pulleys (See Pulleys, Magnetic)

Manganese Steel
American Manganese Steel Co.
Frog Switch & Mfg. Co.
Pettibone-Mulliken Corp.

Manganese Steel Castings
American Manganese Steel Co.
Frog Switch & Mfg. Co.
Pettibone-Mulliken Corp.

Manganese Steel (Plates and Sheets)
American Manganese Steel Co.

Measuring Devices (Electric)
*General Electric Co.

Mechanical Rubber Goods
*Cincinnati Rubber Mfg. Co.
Goodyear Tire & Rubber Co.
Republic Rubber Co.

Meters (Liquid)
Neptune Meter Co.

Mill Liners and Linings
American Manganese Steel Co.
Bartlett & Snow Co., C. O.
*Hardinge Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Traylor Engr. & Mfg. Co.

Mills (Ball, Tube, etc.)
*Allis-Chalmers Mfg. Co.
*Hardinge Co.
*Traylor Engr. & Mfg. Co.

Mills (Grinding) (See also Crushers—Hammer)
*Allis-Chalmers Mfg. Co.
*American Pulverizer Co.
Bartlett & Snow Co., C. O.
Bradley Pulverizer Co.
*Hardinge Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Fdy. & Mch. Co.
*Raymond Pulverizer Div. of Combustion Engr. Co., Inc.
*Sprout, Waldron & Co.
*Traylor Engr. & Mfg. Co.
Universal Crusher Co.
*Williams Patent Crusher & Pulverizer Co.

Motors and Generators
*Allis-Chalmers Mfg. Co.
*General Electric Co.
*Harnischfeger Corp.

Motors (Internal-Combustion) (See Engines — Internal-Combustion)

Netting (Locomotive Stack)
*Tyler Co., W. S.

Nozzles (Gravel Washing)
*Deister Concentrator Co.

Nozzles (Hydraulic) (See Guns—Hydraulic)

Nozzles (Spray)
*Deister Concentrator Co.

Oils
*The Gredag Corp.

Packings
*Cincinnati Rubber Mfg. Co.
Goodyear Tire & Rubber Co
Republic Rubber Co.

Partitions (Wire)
National Wire Cloth Co.

Paving Mixers
*Jaeger Machine Co.
*Koehring Co.

Perforated Metal Plates
*Allis-Chalmers Mfg. Co.
Bartlett & Snow Co., C. O.
Chicago Perforating Co.
Cross Engineering Co.
*Hendrick Mfg. Co.
*Sprout, Waldron & Co.

Pipe, Dredge (Floating and Shore)
Taylor Forge & Pipe Works

Pipe Flanges
Georgia Iron Works
Hetherington & Berner, Inc.
Taylor Forge & Pipe Works

Pipe Forms (Concrete)
Quinn Wire & Iron Works
Universal Concrete Pipe Co.

Pipe Machines (Concrete)
Quinn Wire & Iron Works
Universal Concrete Pipe Co

Pipe (Welded)
Taylor Forge & Pipe Co.

Plants (Aggremeter) (See Aggremeter Plants)

Plug Valves (See Valves)

Pneumatic Conveying Systems (See Conveyors—Pneumatic)

Pneumatic Drills (See Drills, Rock)

Poidometers
Schaffer Poidometer Co.

Portable Conveyors
*Fuller Company
Haiss Mfg. Co., Geo.
Iowa Mfg. Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Robins Conveying Belt Co.

Portable Crushing and Screening Plants
Bartlett & Snow Co., C. O.
*Gruendler Crusher & Pulverizer Co.
Iowa Mfg. Co.
*Jeffrey Mfg. Co.
Universal Crusher Co.
*Williams Patent Crusher & Pulverizer Co.

Portable Engines (See Engines—Internal Combustion)

Portable Loaders (See Loaders and Unloaders)

Power Shovels (See Shovels, Electric, Internal-Combustion and Steam)

Precipitators
*Western Precipitation Corp.

Pre-formed Wire Rope
Broderick & Bascom Rope Co.
*Hazard Wire Rope Division of the American Chain & Cable Co., Inc.
*Leschen & Sons Rope Co., A.
*Roebling's Sons Co., John A.
Williamsport Wire Rope Co.

Proportioning Equipment
*Blaw-Knox Co.
*Jaeger Machine Co.
Schaffer Poidometer Co.

Pulleys
Sprout, Waldron & Co.

Pulleys (Magnetic)
*Sprout, Waldron & Co.

Pulleys (Wing)
*Sprout, Waldron & Co.

Pulverized Fuel Systems
Bartlett & Snow Co., C. O.
*Hardinge Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Raymond Pulverizer Div. of Combustion Engr. Co., Inc.

Pulverizers (See also Crushers, Mills, etc.)
*American Pulverizer Co.
Bartlett & Snow Co., C. O.
Bradley Pulverizer Co.
*Gruendler Crusher & Pulverizer Co.
*Hardinge Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Foundry & Machine Co.
New Holland Machine Co.
*Raymond Pulverizer Div. of Combustion Engr. Co., Inc.
Sturtevant Mill Co.
Traylor Engr. & Mfg. Co.
Universal Crusher Co.
*Williams Patent Crusher & Pulverizer Co.

Pump Parts
Pettibone-Mulliken Corp.

Pump Valves (See Valves, Pump)

Pumps (Air-Lift)
*Chicago Pneumatic Tool Co.
*Fuller Company
*Ingersoll-Rand Co.

Pumps (Bulk Cement)
*Fuller Company

Pumps (Cement Slurry)
Allen-Sherman-Hoff Co.
*Morris Machine Works

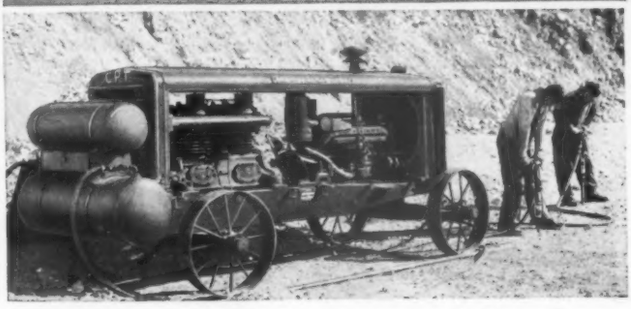
Pumps (Centrifugal)
Allen-Sherman-Hoff Co.
*Allis-Chalmers Mfg. Co.
American Manganese Steel Co.
Erie Pump & Engine Works
Georgia Iron Works
Hetherington & Berner, Inc.
Independent Pneu. Tool Co.
*Jaeger Machine Co.
Kansas City Hay Press Co.
*Morris Machine Works
Pettibone-Mulliken Corp.

Pumps (Dredging)
Allen-Sherman-Hoff Co.
*Allis-Chalmers Mfg. Co.
American Manganese Steel Co.
*Bucyrus-Erie Co.
Erie Pump & Engine Works
Georgia Iron Works
Hetherington & Berner, Inc.
Kansas City Hay Press Co.
*Morris Machine Works
Pettibone-Mulliken Corp.

Pumps (Sand and Gravel)
Allen-Sherman-Hoff Co.
*Allis-Chalmers Mfg. Co.
American Manganese Steel Co.

*See also information in the 1937 Pit and Quarry HANDBOOK.

PORTABLE COMPRESSORS + ROCK DRILLS = PROFITS



THIS CP Two-Stage Air-Cooled Portable Gasoline-Driven Compressor and the CP-42 Sinker Drills are earning profits for a stone quarry.

High compressor efficiency and high drilling speed, dependability and low maintenance cost, backed by a strong service organization, enable CP Compressors and CP Drills to return profits to Contractors, Quarries and others the world over.

Write for Bulletin 758 which describes these outstanding compressors — gasoline and Diesel-driven — and for Bulletin 850 describing CP Sinker Drills.

CHICAGO PNEUMATIC TOOL COMPANY
Sales and Service Branches All Over the World
6 EAST 44th STREET • NEW YORK, N. Y.

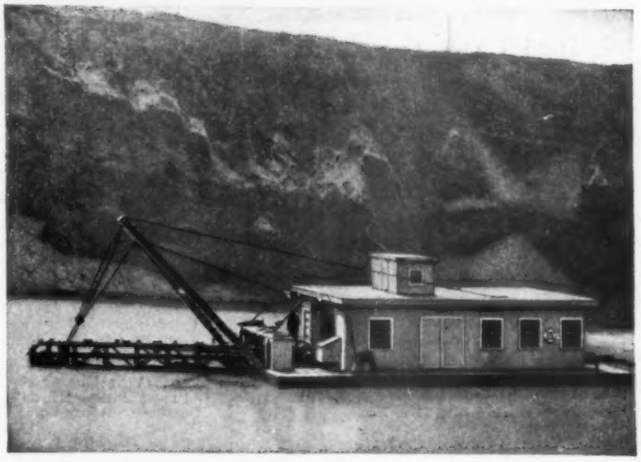
AIR & GAS COMPRESSORS • ROCK DRILLS
DIAMOND CORE DRILLS • DIESEL ENGINES
ELECTRIC TOOLS • PNEUMATIC TOOLS
VACUUM PUMPS & CONDENSERS
OIL WELL ROCK BITS, REAMERS & TOOL JOINTS

CHICAGO PNEUMATIC

C-36-3-½

The MORRIS HYDRAULIC COLUMN

News of interest to Centrifugal Pump Users



A problem and its solution . . .

It was a fine sand and gravel deposit, but compacted to almost rock-like consistency. Four producers tried to work it and failed — their dredges could not dig into it. Along came the fifth producer. He put the problem up to Morris. The solution — a Morris Dredge with traveling screen and spikes which broke up the material into masses which could be handled by the dredge. This and other interesting Morris Dredge production records are described in bulletin which will be sent on request.

A solution and its problem . . .

A 30% sulphuric acid solution at 180 deg. Fahr. is mean to handle. When it carries gritty slurry it presents a double problem — corrosion plus erosion. But this Morris Centrifugal Pump, made of a special alloy developed by Morris, handles the stuff with no fuss or complaint. Write for bulletin on Morris Slurry Pumps.

For authoritative recommendations on any pumping or dredging problem, write to Morris Machine Works, Baldwinsville, N. Y. Representatives in Principal Cities

BUYERS' GUIDE

A Directory of Pit and Quarry Advertisers Indexed According to Product.

Index to Advertisers on Page 104

Erie Pump & Engine Works
Georgia Iron Works
Hetherington & Berner, Inc.
Kansas City Hay Press Co.
*Morris Machine Works
Pettibone-Mulliken Corp.

Pumps (Sump)
*Chicago Pneumatic Tool Co.

Pumps (Vacuum)
*Chicago Pneumatic Tool Co.
*Fuller Company

Ready-Mixed Concrete Plants
Bartlett & Snow Co., C. O.
*Jaeger Machine Co.

Rheostats
*General Electric Co.

Rock Drills (See Drills—Rock)

Rod Mills
*Hardinge Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Traylor Engr. & Mfg. Co.

Rods (Welding)
American Manganese Steel Co.
Stulz-Sickles Co.

Rope (Wire) (See Wire Rope)

Rubbish Burners
Cross Engineering Co.

Sand and Gravel Handling Equipment
*Jeffrey Mfg. Co.
*Link-Belt Co.

Sand Separators
Bartlett & Snow Co., C. O.
*Jeffrey Mfg. Co.
*Link-Belt Co.
McLanahan and Stone Corp.
Simplicity Engr. Co.
Smith Engr. Works

Sand—Lime—Brick Machinery
*Hardinge Co.

Sand-Settling Tanks
Bartlett & Snow Co., C. O.
Iowa Mfg. Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Nordberg Mfg. Co.
Smith Engr. Works

Scales
Buffalo Scale Co.
Howe Scale Co.

Scales (Track or Truck)
Buffalo Scale Co.
Howe Scale Co.

Scrapers (Power Drag)
Continental Roll & Steel Fdry. Company
Iowa Mfg. Co.
*Link-Belt Co.
*Sauerman Bros., Inc.

Scrapers (Wagon)
Continental Roll & Steel Fdry. Company

Screens
*Allis-Chalmers Mfg. Co.
American Manganese Steel Co.
Bacon, Inc., Earle C.
Bartlett & Snow Co., C. O.
Chicago Perforating Co.
Cleveland Wire Cloth & Mfg. Co.
Cross Engineering Co.
*Deister Concentrator Co.
*Deister Machine Co.
*Eagle Iron Works
*Gruendler Crusher & Pulverizer Co.
Haiss Mfg. Co., Geo.
*Hardinge Co.
*Hendrick Mfg. Co.
Iowa Mfg. Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Foundry & Machine Co.
*Link-Belt Co.
Ludlow-Saylor Wire Co.
McLanahan and Stone Corp.
National Wire Cloth Co.
*Nordberg Mfg. Co.
*Robins Conveying Belt Co.
Roebling's Sons Co., John A.
Simplicity Engr. Co.
Smith Engr. Works
*Sprout, Waldron & Co.
Sturtevant Mill Co.
*Traylor Engr. & Mfg. Co.
*Tyler Co., W. S.
Universal Crusher Co.

Screens (Vibrating or Shaking)
*Allis-Chalmers Mfg. Co.
Bartlett & Snow Co., C. O.
*Deister Concentrator Co.
*Deister Machine Co.
*Gruendler Crusher & Pulverizer Co.
Iowa Mfg. Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Foundry & Machine Co.
*Link-Belt Co.
McLanahan and Stone Corp.
New Holland Machine Co.
*Nordberg Mfg. Co.
*Robins Conveying Belt Co.
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Smith Engr. Works
*Sprout, Waldron & Co.
Sturtevant Mill Co.
*Tyler Co., W. S.
Universal Crusher Co.
*Williams Patent Crusher & Pulverizer Co.

Scrubbers
*Traylor Engr. & Mfg. Co.
*Tyler Co., W. S.

Separators (Air) (See Air Separators)

Separators (Magnetic)
Exolon Co.

Sheaves
*Allis-Chalmers Mfg. Co.
American Manganese Steel Co.
*Eagle Iron Works
*Gruendler Crusher & Pulverizer Co.
Haiss Mfg. Co., Geo.
Hetherington & Berner, Inc.
*Link-Belt Co.
*Jeffrey Mfg. Co.
McLanahan and Stone Corp.
Pettibone-Mulliken Corp.
*Sprout, Waldron & Co.

Shovels (Electric, Internal-Combustion and Steam)
*Bay City Shovels, Inc.
*Bucyrus-Erie Co.
*Harnischfeger Corp.
*Koehring Co.
Lima Locomotive Works, Inc.
*Link-Belt Co.
Michigan Power Shovel Co.
Northwest Engr. Co.
Thew Shovel Co.

Skip Hoists and Skips
*Allis Chalmers Mfg. Co.
Bartlett & Snow Co., C. O.
Hetherington & Berner, Inc.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Robins Conveying Belt Co.

Sleeves Dredge
*Cincinnati Rubber Mfg. Co.

Speed Reduction Units
*General Electric Co.
Iowa Mfg. Co.
*Link-Belt Co.

Spirals (Lowering)
Holmes & Bros., Inc., Robt.

Spouts (See Chutes and Chute Liners)

Sprays
*Deister Concentrator Co.

Sprockets and Chain
American Manganese Steel Co.
Bartlett & Snow Co., C. O.
Iowa Mfg. Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
Pettibone-Mulliken Corp.
*Sprout, Waldron & Co.

Stackers
*Jeffrey Mfg. Co.

Starters (Automatic, Motor)
*General Electric Co.

Steel (Alloy)
(See Alloys—Steel)

Steel Grating (See Grating, Steel)

Steel Plate Construction
Hetherington & Berner, Inc.
Holmes & Bros., Inc., Robt.
*Sprout, Waldron & Co.

Stone Grapples
Owen Bucket Co.

Storage Equipment
Bartlett & Snow Co., C. O.
Haiss Mfg. Co., Geo.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Sauerman Bros., Inc.

Surfacers (Concrete)
Independent Pneu. Tool Co.

Sweeping Systems
Allen-Sherman-Hoff Co.

Switchboards (Electric)
*General Electric Co.

Switches (Electric)
*General Electric Co.

Switches (Safety)
*General Electric Co.

Tanks
Bartlett & Snow Co., C. O.
*Hendrick Mfg. Co.
*Link-Belt Co.
*Traylor Engr. & Mfg. Co.

Tanks (Sand-Settling)
Bartlett & Snow Co., C. O.
Iowa Mfg. Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
Smith Engr. Works

Testing Sieves and Shakers
*Hendrick Mfg. Co.
*Tyler Co., W. S.

Thickeners (Slurry)
*Hardinge Co.

Tire Repair Materials
Goodyear Tire & Rubber Co.

Tools (Drill) (See Drilling Accessories)

Track Equipment
Pettibone-Mulliken Corp.

Track Shifters
*Nordberg Mfg. Co.

Tractors
*Allis-Chalmers Mfg. Co.
Caterpillar Tractor Co.

Trailers (Industrial
Easton Car and Const. Co.

Tramways (Aerial)
Roebling's Sons Co., John A.

Transformers
*Allis-Chalmers Mfg. Co.
*General Electric Co.

Transmission Belting (See Belting)

Transmission Machinery
*Allis-Chalmers Mfg. Co.
American Manganese Steel Co.
Bartlett & Snow Co., C. O.
*Gruendler Crusher & Pulverizer Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.

Trippers
Bartlett & Snow Co., C. O.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Robins Conveying Belt Co.

Truck Cranes (See Cranes)

Truck Mixers
Bartlett & Snow Co., C. O.
*Blaw-Knox Co.
*Jaeger Machine Co.

Trucks and Trailers (See Motor Trucks)

Trucks (Hand)
Howe Scale Co.

Tube-Mills (See Mills—Ball, Tube, etc.)

Tubes (For Tire Casings)
Goodyear Tire & Rubber Co.

Turbines
Smith Co., S. Morgan

Turntables (Railway-Industrial)
Easton Car and Const. Co.

Underground Loaders
*Allis-Chalmers Mfg. Co.
Bartlett & Snow Co., C. O.

Unit Heaters
*General Electric Co.

Unloaders (Box Car)
Bartlett & Snow Co., C. O.
*Fuller Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.

Valves (Pump)
*Cincinnati Rubber Mfg. Co.
Taylor Forge & Pipe Works

Variable Speed Reducers or Transmissions
*Link-Belt Co.

Vibrating Screen Plate
Bartlett & Snow Co., C. O.
Chicago Perforating Co.
Cross Engineering Co.
*Hendrick Mfg. Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.

Vibrating Screens (See Screens—Vibrating)

Vibrators
Independent Pneu. Tool Co.
*Jeffrey Mfg. Co.
*Tyler Co., W. S.

Wagons (Dump)
Easton Car and Const. Co.
*Koehring Co.
Le Tourneau, Inc., R. G.

Wagon Scrapers
Continental Roll & Steel Fdry. Co.

Washers (Sand, Gravel and Stone)
*Allis-Chalmers Mfg. Co.
Bartlett & Snow Co., C. O.
*Eagle Iron Works
Haiss Mfg. Co., Geo.
*Hardinge Co.
Iowa Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Foundry & Mach. Co.
*Link-Belt Co.
McLanahan and Stone Corp.
Smith Engr. Works
*Traylor Engr. & Mfg. Co.
*Tyler Co., W. S.
Universal Crusher Co.

Weighing Equipment (Automatic)
*Blaw-Knox Co.
*Fuller Co.
Howe Scale Co.
*Jaeger Machine Co.
Schaffer Poidometer Co.

Welding Bars, Wedge and Applicator (Nickel - Manganese Steel)
Stulz-Sickles Co.

Welding and Cutting Equipment
*General Electric Co.
Smith Company, S. Morgan
Stulz-Sickles Co.

Welding Rods
American Manganese Steel Co.
Bradley Pulverizer Co.
Stulz-Sickles Co.

Welding Service
*Rock Bit Sales & Service, Inc.
Smith Co., S. Morgan
Stulz-Sickles Co.

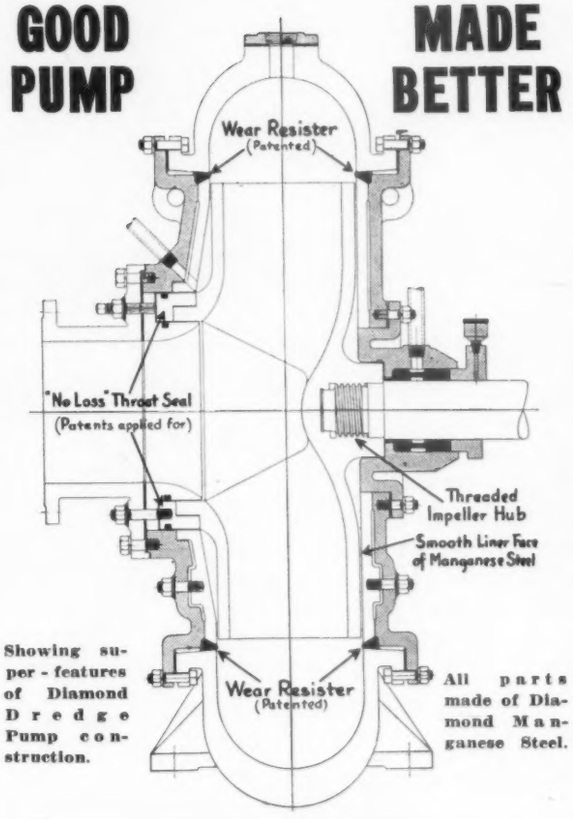
Welding Supplies
American Manganese Steel Co.
*General Electric Co.
*Harnischfeger Corp.
Roebling's Sons Co., John A.
Stulz-Sickles Co.

Well Drills (See Drills—Well)

*See also information in the 1937 Pit and Quarry HANDBOOK.

DIAMOND

A GOOD PUMP NOW MADE BETTER


Wear Resister (Patented)
"No Loss" Throat Seal (Patents applied for)
Threaded Impeller Hub
Smooth Liner Face of Manganese Steel
Wear Resister (Patented)

Showing super-features of Diamond Dredge Pump construction.

All parts made of Diamond Manganese Steel.

DIAMOND DREDGE PUMP

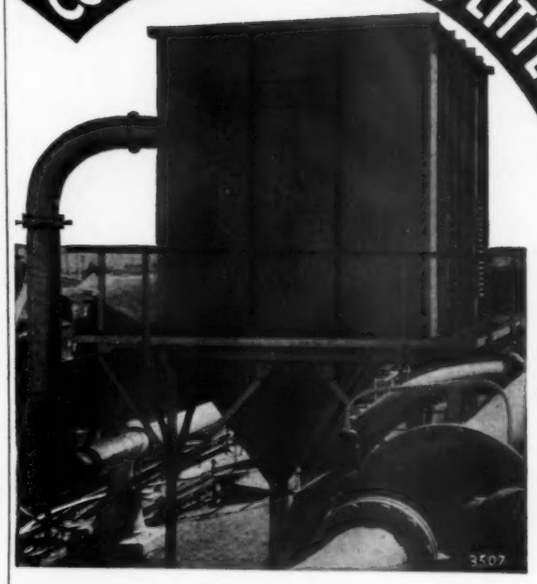
now give their users even better performance because of newly developed features. Operators can now produce material at a still lower cost. The patented "Wear Resister" protects pump shell, side plates and liners from wear at vital points. Threaded Impeller Hub or Bore gives greater impeller throat clearance and insures a true running impeller at all times. "No Loss" Throat Seal prevents internal leakage. P.M. Co. Products include Traveling Chain Cutter, Rotary Cutters, Elbows, Flap Valves, Nipples, Jaw Plates, Crusher Parts, Dippers, Dipper Teeth, Sheaves, and other Manganese Steel Products.

PETTIBONE MULLIKEN CORP.

4710 W. Division St. Chicago, Ill.

SLY DUST CONTROL

COSTS LITTLE TO BUY, LITTLE TO OPERATE.



Sly Dust Filter on roof of cement silo.

LET us apply our thirty-eight years of experience to your dust control problem. Let us SHOW how the dust nuisance and a considerable loss of product can be ended at low cost.

The Sly Dust Filter, the heart of a Sly Dust Control System, is of simple and exclusive design for highest efficiency, lower first cost and lower maintenance cost. Dust is collected on the OUTSIDE of flat cloth bags. A compression spring keeps bag taut for most effective dust removal by a simple motor shaker.

Individual bags are quickly changed without interruption in service of filter. Plenty of space provides easy access.

The filter case is thoroughly standardized for lower first cost and lower erection cost.

Write for Bulletin S-85, A COMPLETE TREATISE ON DUST CONTROL. It's yours for the asking.

CLOTH BAG SLY Dust Filters FOR DUST CONTROL

SUPPRESSION···POSITIVE COLLECTION···DISPOSAL

The W. W. Sly Manufacturing Co.

4726 Train Ave., Cleveland, Ohio

BUYERS' GUIDE

A Directory of Pit and Quarry Advertisers Indexed According to Product.

Index to Advertisers on Page 104

Wheels (Car)
American Manganese Steel Co.
*Eagle Iron Works
Iowa Mfg. Co.
Pettibone -Mulliken Corp.

Wheel Rims. See Rims—Wheel

Winches and Capstans
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Robins Conveying Belt Co.
*Sprout, Waldron & Co.

Wire and Cable (Electric)
*General Electric Co.
*Roebling's Sons Co., John A.

Wire Cloth
Cleveland Wire Cloth & Mfg Co.
Ludlow-Saylor Wire Co.
National Wire Cloth Co.
*Robins Conveying Belt Co.
Roebling's Sons Co., John A.
Tyler Co., W. S.

Wire Rope
Broderick & Bascom Rope Co.
*Hazard Wire Rope Division of the American Chain & Cable Co., Inc.
Roebling's Sons Co., John A.
Union Wire Rope Co.
*Leschen & Sons Rope Co., A.
Williamsport Wire Rope Co.

Wire Rope Fittings
Broderick & Bascom Rope Co.
*Hazard Wire Rope Division of the American Chain & Cable Co., Inc.
*Leschen & Sons Wire Rope Co., A.
Roebling's Sons Co., John A.
Union Wire Rope Co.
Williamsport Wire Rope Co.

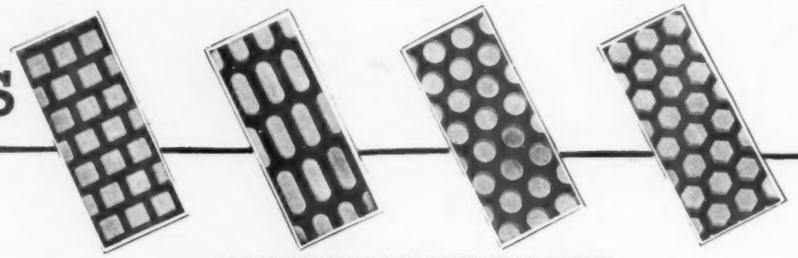
Wire Rope Slings
Broderick & Bascom Rope Co.
*Hazard Wire Rope Division of the American Chain & Cable Co., Inc.
*Leschen & Sons Rope Co., A.
Roebling's Sons Co., John A.
Union Wire Rope Co.
Williamsport Wire Rope Co

Wire (Welding)
American Manganese Steel Co.
Roebling's Sons Co., John A.

Worm Gears (See Gears and Pinions)

* See also information in the 1937 Pit and Quarry HANDBOOK.

CROSS



PERFORATED PLATES

For Vibrating, Rotary and Shaking Screens.

Always available: Any Size, Any Metal, Any Opening you need.

CROSS SCREENS ARE DEFINITELY BETTER

Steel is specially specified for toughness and abrasion resistance; holes clean cut and conical, so do not plug; no strain or cracking of the metal, leaving full resistance to abrasion and corrosion. Plates accurately finished to dimensions; require less installation cost.

OPERATING MEN WHO HAVE COMPARED CLOSELY CONCEDE THESE ADVANTAGES.

CROSS ENGINEERING CO.

Main Office and Manufacturing Plant: CARBONDALE, PENNA.

Owen "puts teeth into your digging" with unusual results by equipping an extra efficient bucket with teeth particularly adapted for the work at hand.

An extensive line of teeth is described in the new Owen catalog including entirely new types in various shapes and sizes.

Write for your copy.

The OWEN BUCKET Co.
6050 Breakwater Ave., Cleveland, Ohio
Branches: New York Philadelphia Chicago Berkeley, Cal.

Economical

On All Material Handling Machines. Try It!

BRODERICK & BASCOM ROPE CO., ST. LOUIS

Factories:
St. Louis - Seattle - Peoria
Branches:
New York-Chicago-Seattle-Portland-Houston

Lewistown Foundry Products ARE

Performance-Tested

BUCKET ELEVATORS
REVOLVING SCREENS
CRUSHERS DRY PANS

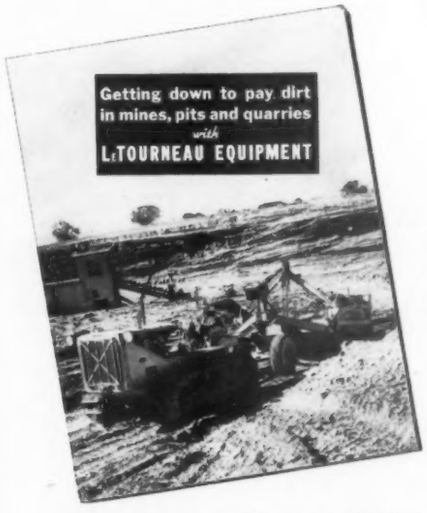
Lewistown Foundry & Machine Co.
Lewistown, Pa.

BRIDGETOWN WASTES into old pits.....

On a 1250-foot one-way haul this rig averaged a load each 8 minutes, moved 60 cubic yards hourly.

Bridgetown Sand & Gravel Company, Berlin, N. J., uses a LeTourneau U-12 Carryall Scraper and "Caterpillar" RD8 tractor to strip overburden from its sand deposits. The Scraper wastes the stripped material along the banks of the operation, then as soon as the sand is removed a LeTourneau Bulldozer pushes the waste into the worked-out pits, thus effectively disposing of overburden. The Bulldozer also clears trees and rocks from the stripping area.

Many another pit, like Bridgetown, has found LeTourneau equipment the most economical method of handling overburden. Ask your "Caterpillar" dealer what it can do for you.



WRITE for this new folder — "Getting Down to Pay Dirt in Pits, Mines and Quarries."

R. G. LeTOURNEAU, INC.
Peoria, Illinois .·. Stockton, California
Cable Address: "Bobletorno"

MANUFACTURERS OF: Angledozers*, Buggies*, Bulldozers, Carryall* Scrapers, Cranes, Drag Scrapers, Power Control Units, Rooters*, Treedozers.

*Name registered U. S. Patent Office

with this
NEW BUFFALO PLAN

YOU CAN NOW HAVE *the* PROFIT INSURANCE of *NEW* BUFFALO SCALES *with* LOW CASH OUTLAY

This Buffalo Scale Plan is offered as a helpful service in replacing old equipment as well as installing new scales to meet the growing use of motor trucks for short and long hauls.

With low cash outlay, this Buffalo Plan gives you the profit insurance and customer satisfaction that goes with weighing equipment, designed and built to provide and MAINTAIN accuracy under the punishment of the high tonnages and severe starting and stopping shocks encountered in heavy truck service.

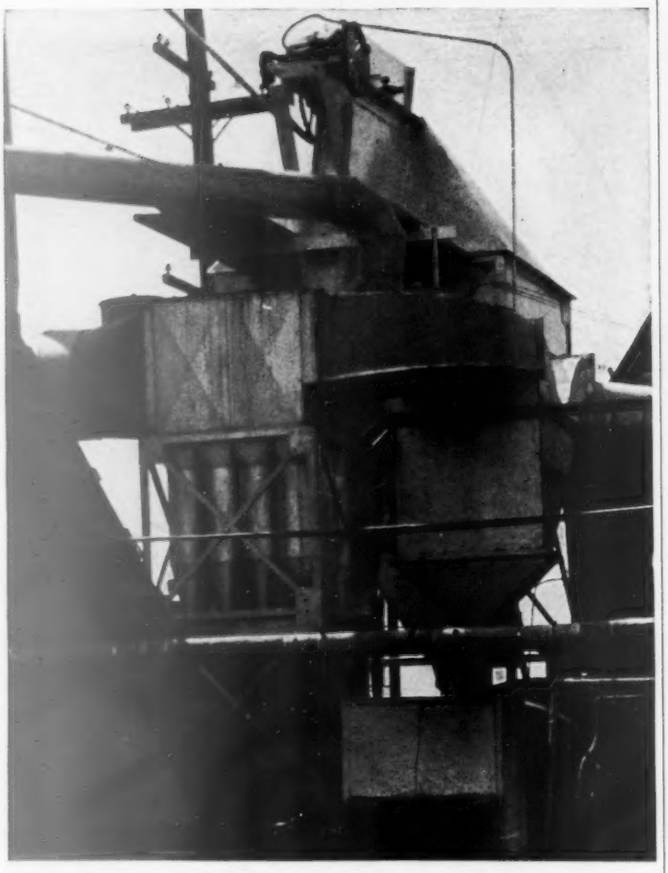
Send coupon for your personal copy of Bulletin 758 showing features of Series 3200 Truck Scales and complete information on how the Buffalo Scales Plan makes them available with low cash outlay . . the same way that motor trucks and other heavy equipment are sold.

BUFFALO SCALE COMPANY
1200 Niagara Street BUFFALO, N. Y., U. S. A.

Buffalo
Chicago
Cleveland
Detroit
Los Angeles
New York
Philadelphia
Pittsburgh
San Francisco
St. Louis

Cutaway view showing latest type Buffalo Truck Scales. Send coupon.....

Buffalo Scale Co.,
Buffalo, N. Y.
Please send Bulletin 758 on Truck Scales and information on Finance Plan.
Name .....
Concern .....
Street .....
City PQ9



Impax Separator used with Multiclone for classifying dusts in a Rock Drying Plant.

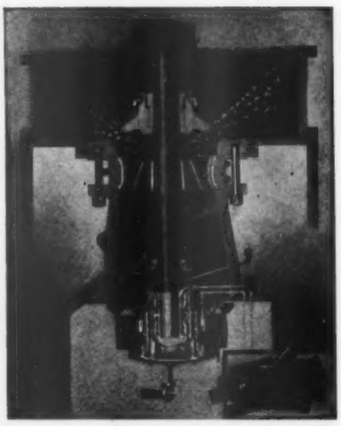
FOR SEPARATION AND COLLECTION

In handling dust laden gases in which there is a mixture of large and small particles, it is often desirable to separate the coarse from the fines. In such cases the recommended equipment includes a Western Precipitation Impax Separator and a suitable arrangement of Multiclones. Large particles are collected in the Impax Separator and automatically removed, while finer material is recovered by the Multiclones.

Small tube construction used in Multiclones results in low turbulance, positive dust conduction and maximum centrifugal force to throw the suspended material out of the gas stream. Large volumes of gas can be handled by grouping unit tubes in parallel to any desired capacity. Multiclones are all metal, able to handle hot or cold gases without fire hazard and occupy small floor space and headroom. No water or filter cloths are used. All parts are readily accessible for cleaning or sterilization. Low draft loss conserves power and reduces operating costs.

Multiclones provide for the maximum collection of fine particles and are widely used at the end of process production lines for the collection of commercial powders.

WESTERN PRECIPITATION CORPORATION
1016 West 9th Street, Los Angeles, California • New York, N. Y.
Precipitation Co. of Canada, Ltd., Dominion Sq. Bldg., Montreal
PIONEER IN DUST AND FUME CONTROL



GREATER TONNAGE with HALF THE POWER COST Guaranteed

THE Kennedy Ball Bearing Gearless Gyratory Crusher is guaranteed to produce a greater tonnage than any other crusher of a given size, with half the power per ton of ore. This crusher can be equipped with a synchronous motor in its pulley, or driven by flat or V-belt from a standard motor.

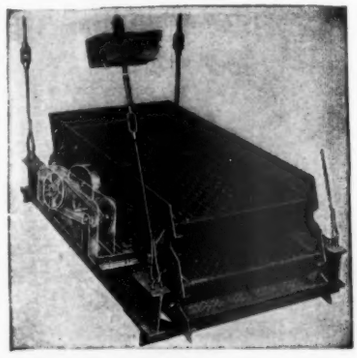
The Savings Effected with this crusher are astounding:

In cost of Maintenance 80%
In Power ..... The entire cost of crusher and motor in pulley is amortized annually.

Sieving test on glacial gravel crushed at the rate of 18 tons per hour, with No. 19 crusher set to ⅛ in., and using less than 25 hp., follows:

Minus ⅜ in.	100%
Plus 3 mesh	21½%
Minus 3—Plus 4	17%
Minus 4—Plus 14	36½%
Minus 14—Plus 48	15%
Minus 48—Plus 100	4%
Minus 100	5½%

KENNEDY VIBRATING SCREEN



Built in open or enclosed types, in widths ranging from 3′ to 6′ with one or more decks. It can be suspended, or supported from the bottom.

Suitable for scalping oversize from primary crushers, as well as smaller sizes, and chemical products.

The entire screening surface is effective, thereby insuring greatest capacity.

Equipped with self-aligning main bearings which account for low power consumption and also for long life of bearings.

Screen drive shaft is positioned near the feed end for balancing purposes and is patented.

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Sales Agents in all Principal Cities of the United States.

WILLIAMS HAMMER CRUSHERS STAND FIRST IN BETTER STONE CRUSHING

Crush 36 in. Rock to 1¼ in. in One Operation

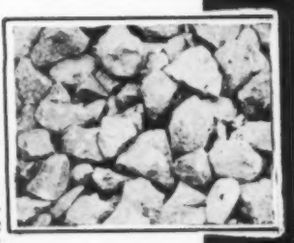
With One Williams Crusher—Saving in Investment of 50% to 75%

(A Size Crusher for every job
Capacities 3 to 300 tons per hour)

Power Shovel loaded rock reduced to commercial size in one operation with one Williams Crusher. Saves much sledging and avoids secondary blasting—Saves by use of smaller buildings, fewer foundations, conveyors, drives and motors. Write for literature.

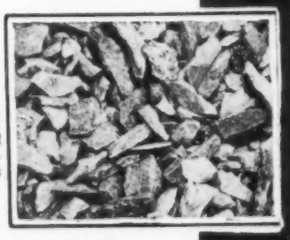
CUTAWAY VIEW
of a Williams "Jumbo Junior" Crusher, Showing Hammers and Sizing Grates.

A Williams Crushed Product
(Actual Photo)
Note the cubular form of Product with no slivers and slabs.



Both samples taken from the same quarry

Ordinary Crushed Product
(Actual Photo)
Note slivers and slabs not crushed by a Williams crusher.



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You are assured of efficient, dependable and economical operation when using Eagle Sand and Gravel Washers, single or twin screw. Gives you greater capacity which speeds up production. More scrubbing action produces cleaner sand and gravel to meet rigid specications which means greater profits. Eagle Washers operate smoother and are sturdily constructed for years of service. Write for Bulletin covering Eagle Washers.

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Established 1891

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SAVES TIME and MONEY from FIRST to LAST

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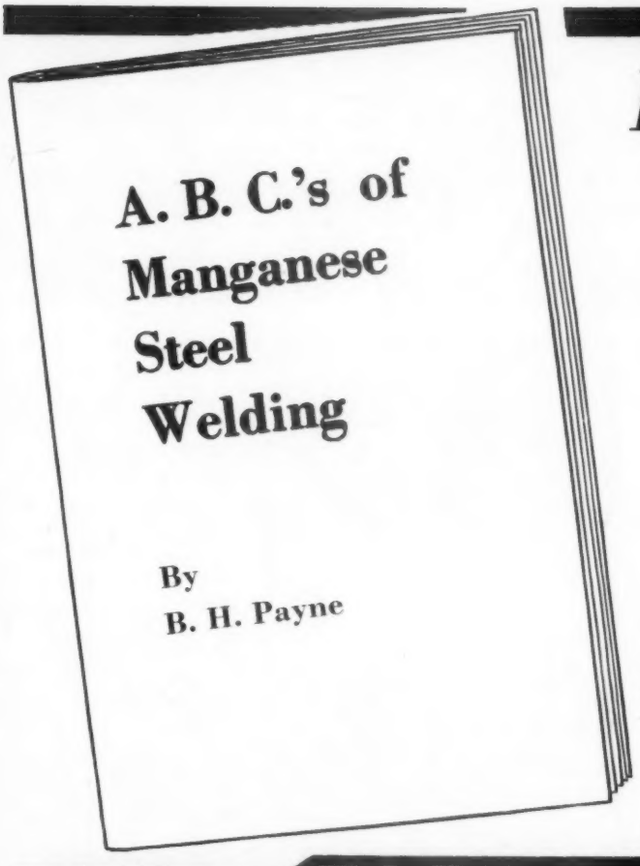

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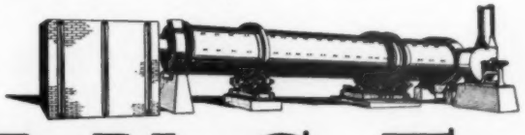

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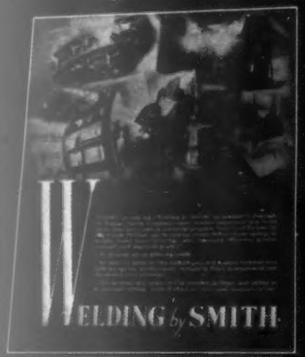

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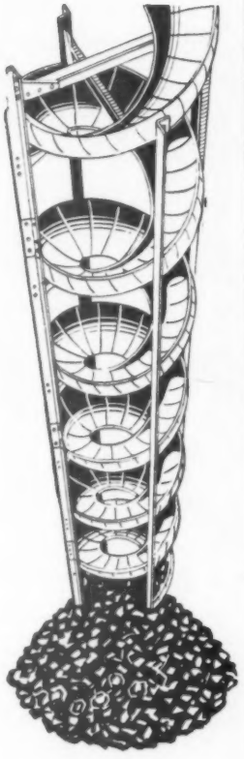

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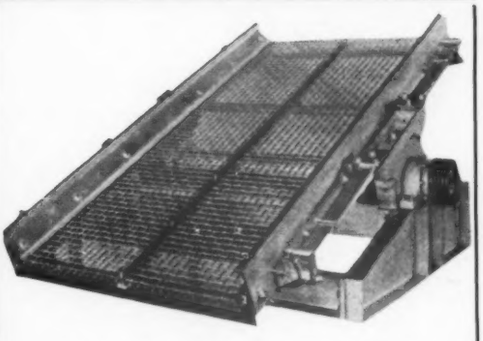

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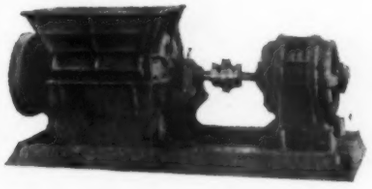

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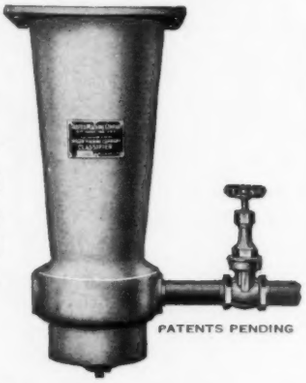

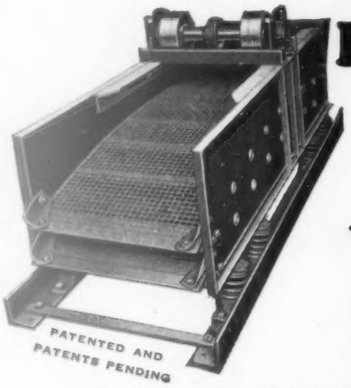

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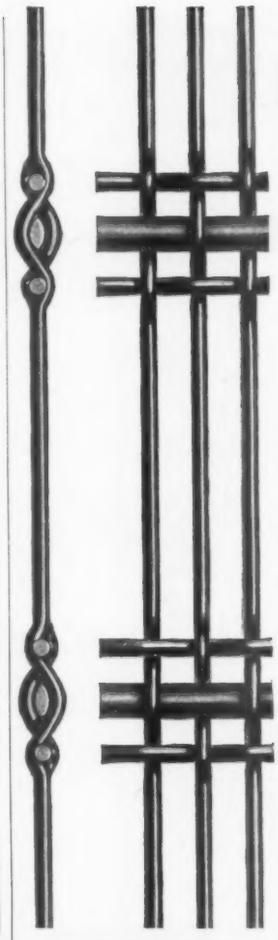

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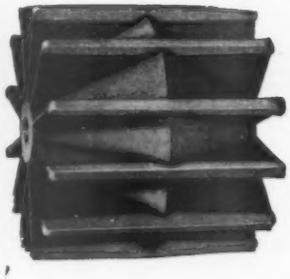

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where SPROUT-WALDRON Wing Pulleys are used. The same is true of your Elevator belts.

Material conveyed cannot lodge between belt and pulley to cut your belts.

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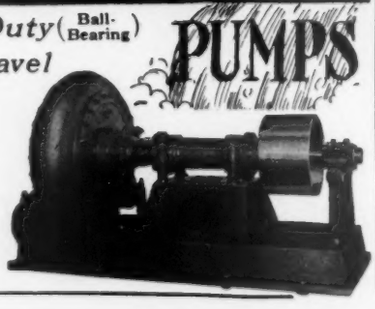

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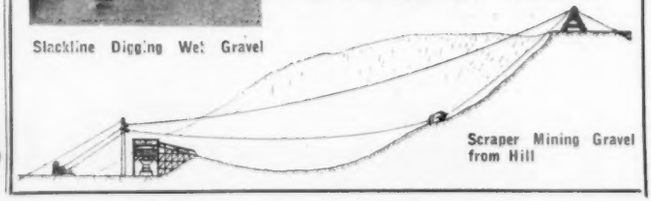

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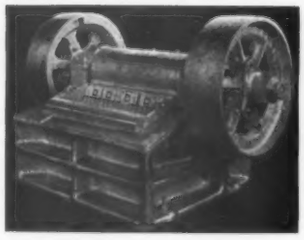

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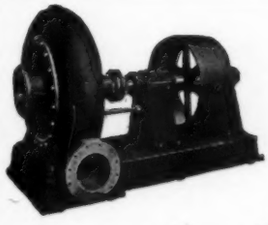

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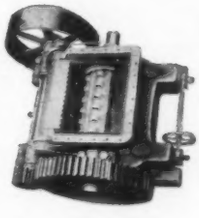

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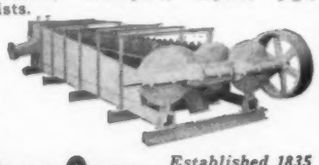

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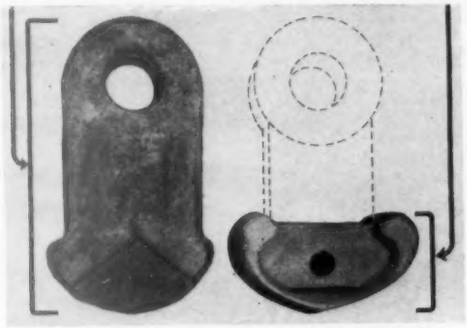

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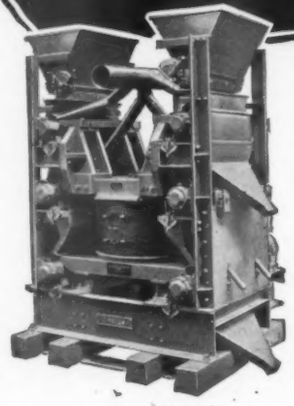

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6—Wagon drills, Ingersoll Rand & Gardner Denver with IRX71 and GD17 & 21 drills.

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5—All steel stiff leg derricks: 1—25 ton Clyde, 50′ boom; 1—15 ton Dobbie, 80′ boom; 1—15 ton Clyde, 50′ boom; 1—15 ton Clyde "A" frame barge derrick, 50′ boom; 1—10 ton Insley, 80′ boom.
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6—Elec. storage battery type, 4 ton, 24″ ga. with battery boxes: 4—Whitcomb; 2—Atlas.
22—Gas locomotives: 6—8 ton Vulcan std. ga.; 2—7 & 8 ton Whitcomb, 36″ ga.; 3—4 ton Vulcan & Davenport, gear drive, 36″ ga.; 1—4 ton Plymouth friction drive, 36″ ga.; 7—7 ton Whitcomb & Plymouth, gear drive, 24″ ga.; 3—Plymouth 4 ton, 24″ ga.

PUMPS
4—10″ Allis Chalmers centrifugal pumps, direct connected to 2 HP., 440 V., A.C., motors; cap. 3500 GPM, 175′ head.

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1—10 ton Huber Roller 3 Wh. with Scarifier.
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2—Barnes Triplex Road Pump.
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6—12 & 14 ton Vulcan, 36 in. ga. Gas.
3—5 & 6 ton Plymouth, 36 in. ga. Gas.

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3" Centrif. Pump, 7½-hp. mtr. 200-gal., 128'.
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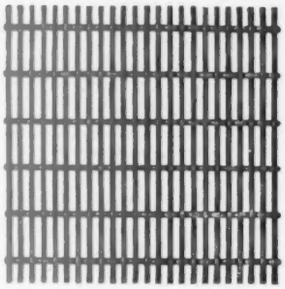

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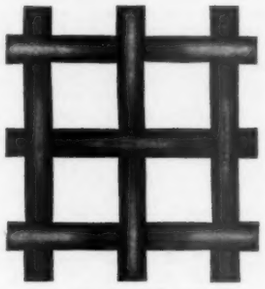

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Index to Advertisers

Allen-Sherman-Hoff Co. ..... Inside Front Cover
*Allis-Chalmers Mfg. Co. ..... Back Cover
American Manganese Steel Co. 83
*American Pulverizer Co. 95
*Arnold & Weigel 67

Bacon, Inc., Earle C. 72
Baker & Greenberg 99
Barker-Goldman-Lubin Co. 101
*Bartlett & Snow Co., C. O. 97
Bay City Shovels, Inc. 71
Birmingham Rail & Locomotive Co. 103
*Blaw-Knox Co. 64
Bradley Pulverizer Co. 71
Broadcast Section 99–103
Broderick & Bascom Rope Co. 88
*Bucyrus-Erie Co. 81
*Bucyrus-Monighan Co. 81
Buffalo Scale Co. 89

Caterpillar Tractor Co. 5
*Chain Belt Co. 73
Chicago Perforating Co. 74
*Chicago Pneumatic Tool Co. 85
*Cincinnati Rubber Mfg. Co. 20
Cleveland Rock Drill Co. 14
Cleveland Wire Cloth & Mfg. Co. 104
*Consolidated Products Co. 103
Continental Roll & Steel Foundry Co. 3
*Cooper-Bessemer Corp. 69
Cross Engineering Co. 88

*Deister Concentrator Co. 78
Deister Machine Co. 96
*Dixie Machinery Mfg. Co. 76
Dracco Corp. 69
Dunn Mfg. Co., W. E. 65

*Eagle Iron Works 91
Easton Car & Construction Co. 94
Electric Steel Foundry Co. 98
*Ensign-Bickford Co. 16
Equipment Corporation of America 99
Erie Pump & Engine Works 97
Exolon Co. 98

Flexible Steel Lacing Co. 95
Frog, Switch & Mfg. Co. 72
*Fuller Co. 11

Gardner-Denver Co. 83
Georgia Iron Works 92
*General Electric Co. 6
Goodyear Tire & Rubber Co. 24
*Gredag Corp. 70
*Gruendler Crusher & Pulverizer Co. 78

Haiss Mfg. Co., Geo. 73
Hardinge Co. 93
*Harnischfeger Corp. 22
*Hazard Wire Rope, Division of American Chain & Cable Co. ..... Inside Back Cover
Hendrick Mfg. Co. 97
Hetherington & Berner, Inc. 104
Hoffman Bros. Drilling Co. 102
Holmes & Bros., Inc., Robt. 95
Howe Scale Co. 68
*Huron Industries Co. 95
Hummel-Foley Corp. 97
*Hyman-Michaels Co. 101

Independent Pneumatic Tool Co. 7
Iowa Mfg. Co. 97

*Jaeger Machine Co. 73
*Jeffrey Mfg. Co. 79

Kansas City Hay Press Co. 96
*Kennedy-Van Saun Mfg. & Engr. Corp. 90
*Koehring Co. 4

Lane Co., T. J. 99
Lembo Corp., J. C. 100
*Leschen & Sons Rope Co., A. 75
Le Tourneau, Inc., R. G. 89
Lewis, Harry C. 100
Lewiston Foundry & Machine Co. 88
*Lima Locomotive Works 17
*Link-Belt Co. 1–94
Ludlow-Saylor Wire Co. 96

McLanahan & Stone Corp. 97
McLeod, Alex. T. 99
Michigan Power Shovel Co. 92
*Morris Machine Works 85

National Supply Co. 2
National Wire Cloth Co. 70
Neptune Meter Co. 63
New Holland Machine Co. 75
*Nordberg Mfg. Co. 96
Northwest Engineering Co. 9

O'Neill, A. J. 103
Owen Bucket Co. 88

*Parsons Engineering Co. 76
Pennsylvania Drilling Co. 102
Pettibone Mulliken Corp. 87
Quinn Wire & Iron Works 65
*Raymond Pulverizer Div. of Combustion Engr. Co., Inc. 15
Rental Service Co. 103
Republic Rubber Co. 97
*Robins Conveying Belt Co. 26
Rock Bit Sales & Service, Inc. 77
*Roebling's Sons Co., John A. 13

*Sauerman Bros., Inc. 96
Schaffer Poidometer Co. 73
Simplicity Engineering Co. 77
S. K. F. Industries, Inc. 12
*Sly Mfg. Co., W. W. 87
Smith Co., S. Morgan 94
Smith Engineering Works 21
Smith, Inc., L. B. 101
Sprout, Waldron & Co. 96
Stanhope, Inc., R. C. 99
Stulz-Sickles Co. 93
Sturtevant Mill Co. 74

Taylor Forge & Pipe Works 79
Thew Shovel Co. 19
Tidewater Equipment & Machy. Corp. 100
Timken Roller Bearing Co. 8
*Traylor Engineering & Mfg. Co. 81
*Tyler Co., W. S. 94

Union Wire Rope Corp. 10
Universal Concrete Pipe Co. 63
Universal Crusher Co. 23

Walsh, J. T. 103
Walsh Co., Richard P. 99
*Warren Bros. Roads Co. 65
Wellman Engineering Co. 97
*Western Precipitation Corp. 90
*Williams Patent Crusher & Pulverizer Co. 91
Williamsport Wire Rope Co. 18

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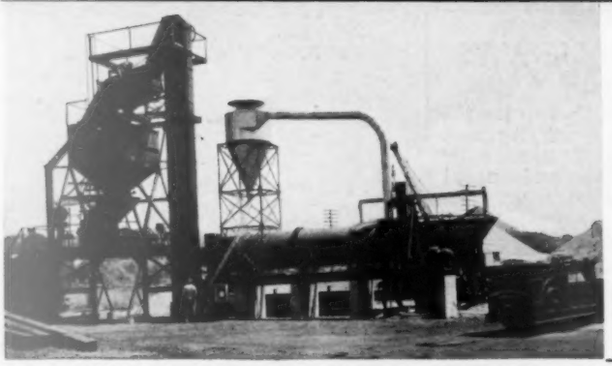

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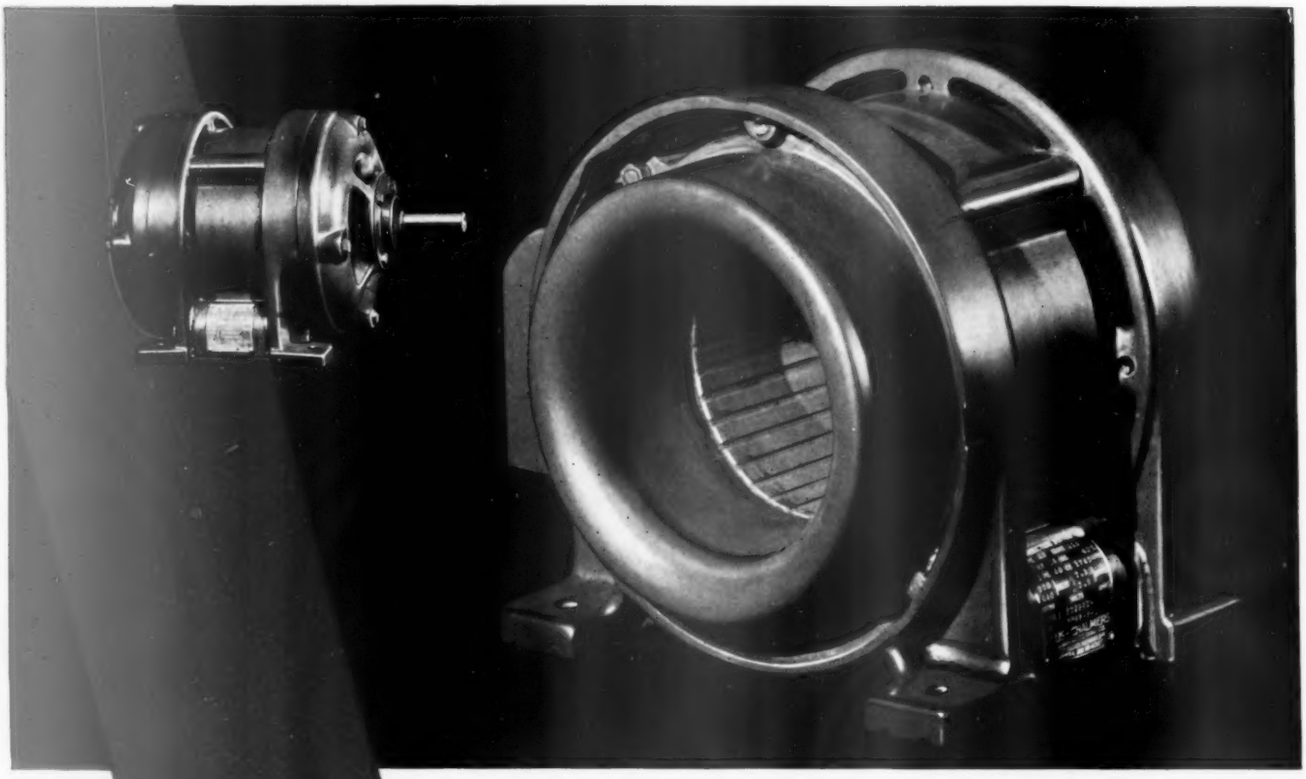

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